



JOURNAL

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1891.

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WILLIAM L. HASKIN,
Editor.

Authors alone are re-
sponsible for opinions
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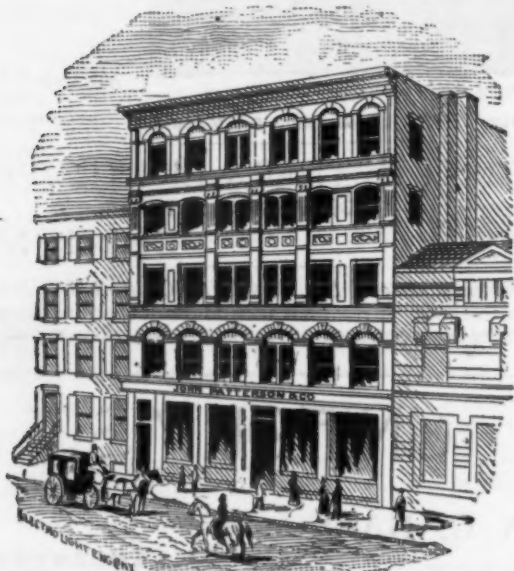
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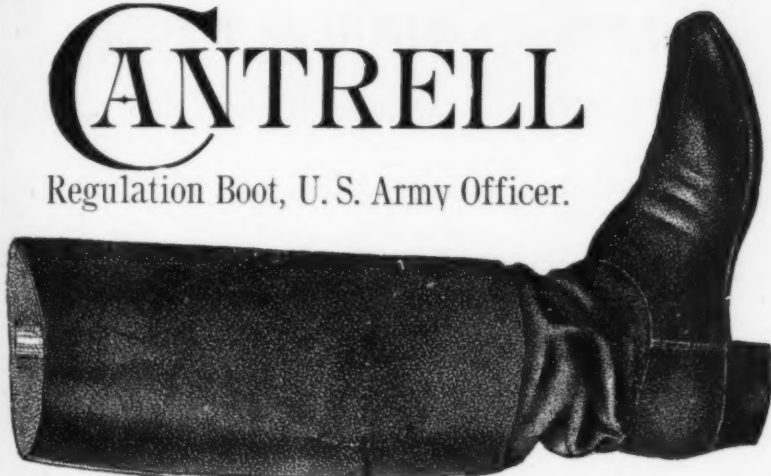
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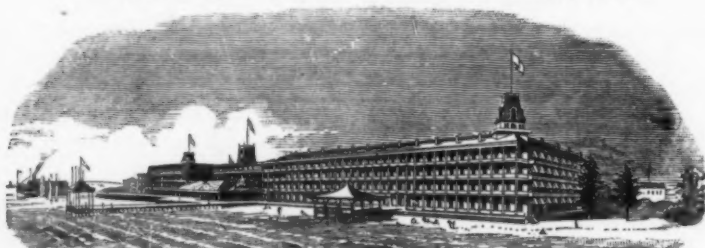
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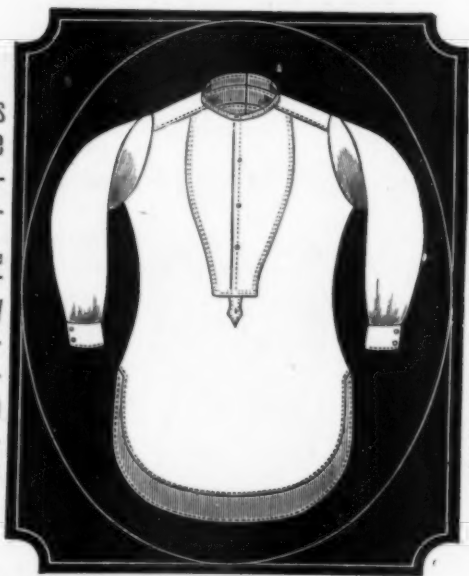
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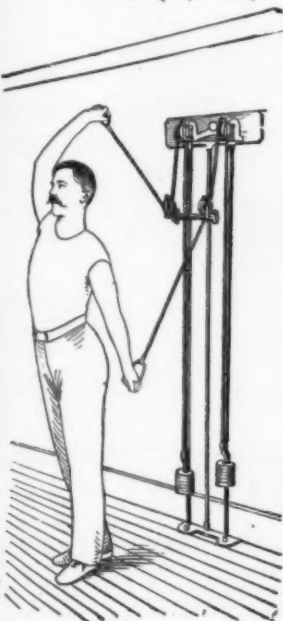
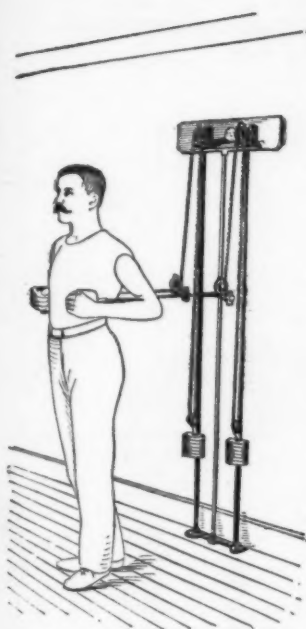
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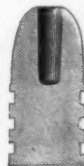
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Prize Essay.

A PRACTICAL SCHEME FOR TRAINING THE REGULAR ARMY IN FIELD DUTIES FOR WAR.

BY LIEUT. GEORGE W. READ, U. S. A.,

FIFTH CAVALRY.

"War is the harvest of peace, the seed sown in peace is then reaped."

*"We train men in peace for what we wish them to do in war. When war comes, we must be satisfied if they do what we have taught them. If the instruction is faulty, the country whose armies have been badly trained suffers. When war is declared, the time of preparation, the time for training is past, the day of action has come. If the weapon is not well tempered, wants edge, and is useless, the responsibility rests with those who have allowed it to become so." **

NECESSITY FOR TRAINING.

AT the close of the Rebellion, the Regular Army was in a state of high efficiency in field duties for war. Since that time it has been "scattered in small detachments over our vast domain," protecting the lives and property of the pioneer and guarding the construction parties of railways, enabling civilization to penetrate to the most remote and formerly inaccessible regions. Occupied with these important duties, it has been impossible to keep pace in training with the ever changing requirements of civilized warfare.

But the work upon which it has been so long engaged is now approaching completion. The Indians are under control and facilities for rapid transport make it possible to concentrate the

* Home's Precis, p. 104.

larger part of the Army at regimental, or at least battalion posts.* The increased facilities for training resulting from this concentration come at an opportune moment, as the present is a transition epoch in our military affairs as well as in the duties of the Army. Having practically accomplished the gigantic task upon which it has been so long engaged, it will now be expected to become the military training school of the Nation, the fountain head of the Art and Science of War, the repository of military traditions. On this little force of regulars, with one representative to every 2569 of our population,† the military strength of the nation must chiefly depend; the importance of thorough and complete training cannot, therefore, be overestimated. Heretofore, save in exceptional cases, such training has been impracticable, although proficiency has been maintained in the ordinary manoeuvre drill of small bodies. The Inspector-General's Report, 1889, (quoting from the report of Major Sanger) says: "There is no difficulty about mere drills, parades, reviews, etc., in our garrisons; these take place as a rule in strict conformity with tactics and regulations, and are generally attended as prescribed. It is the application of principles which is so much desired and which is rarely tried."

That more advanced training is essential to efficiency for war is recognized by all authorities.

"Formerly we depended on the perfect drilling of our men; henceforward it is upon the efficiency of battle training and fire discipline we shall have to rely. Unless our regiments be first-rate in both these points we can no longer hope for victory, although they may be able to march past like a wall, and go through the most complicated barrack-yard evolutions with the utmost precision."‡

"A knowledge of drill, and the power of adjusting the formation of troops to ground, is at the present day more requisite and more difficult than ever it was, and this fact should be recognized and met by a thorough practical training on the part of the company officers to adapt not only the formation of companies but also of small bodies of men to the ground worked over. Such training is not acquired in a day, such knowledge cannot be

* Report of Secretary of War, 1889, p. 5.

† Report of Secretary of War, 1889, p. 4.

‡ Quoted in "The Army of the United States," *Harper's Magazine*, March, 1890, p. 509.

learned from a drill-sergeant in a barrack-square or a drill-shed, but must be imparted by men who have carefully and practically worked out these questions, and it must be taught on diversified ground of some extent." *

"In order to work with tolerable readiness in such lines of skirmishers as we meet now-a-days in battle, a man should have gone through something like it in peace time. He should have gained as good an idea of this sort of thing as possible; he should not merely know by hearsay, but experience in his own person, that if separated from his own company and unable to rejoin it, he at once comes under command of the officers who may happen to be where he is. He should be prepared to get quickly at home amongst new comrades. An officer, on the other hand, when he sees stray soldiers in action, should take them under his command, either forming them into a compact body or leading them into the line of skirmishers." †

SCOPE OF REQUIRED TRAINING.

Although instruction in battle tactics and field duties for war are essential, elementary drill is as necessary as ever it was. The same ground must be gone over as formerly and a great deal more besides.

"It is often said that if troops do not change front and manœuvre under fire, it is needless to teach them more than what they do when actually engaged. This is founded on an entire misconception of what the duties of troops really are. These things are but means to an end, and most important means; for one day's fighting, troops have thirty days marching and manœuvring, and the power of marching and manœuvring is of the utmost importance, not only as giving that training which enables the men to be placed in front of their enemies, but producing that discipline without which everything else is useless." ‡

In addition, therefore, to practice in the duties it would be required to perform in the field in time of war, the training of the Army in field duties for war must include the preparatory work necessary to make a soldier out of a recruit and a cohesive, mobile, disciplined body out of the heterogeneous material supplied by recruiting officers. This preparatory work is quite as

*Home's *Precis*, p. 101.

†Home's *Precis*, p. 100. (Boguslauski.)

‡Home's *Precis*, p. 100.

important as that of a more advanced kind, for unless it be done thoroughly, the latter will necessarily be unsatisfactory. The entire system of training should have efficiency for war as its object and to be complete must show the successive steps from the training of the individual to the field exercises of the largest commands; and while more careful attention will be given to training in field duties proper, elementary instruction will not be denied a place in the scheme to be proposed.

It is the purpose of this paper to assume the regulations and general orders in force providing for the training of the Army, and to avoid any proposition dependent on legislation or modification of present requirements.

Organization, armament, and drill regulations may be passed without discussion, since the changes under consideration will affect only the details, and not at all the general plan, of instruction.

PRESENT REQUIREMENTS.

The following provisions of regulations* and orders† are adopted as the foundation of the proposed scheme for training:

1. "The regiment is * * * formed for purposes of administration, discipline, and *instruction*."
2. "A regimental commander should continually labor for the instruction and efficiency of his regiment."
3. "Both practical and theoretical instruction shall be systematically conducted. Theoretical instruction, imparted by lectures, recitations, or other methods, will be given at least twice each week from October 1st to March 31st of each year, in the authorized drill regulations and such other military books of authority, or upon such military subjects as may be prescribed by the War Department, upon the recommendation of the General commanding the Army. Captains will be responsible for the practical and theoretical instruction of their non-commissioned officers, which will be regarded as strictly military duty, and will be so carried on as not to occupy any part of the hours devoted to rest and recreation. Regimental commanders will supervise the instruction of the officers under their immediate control, and post commanders, that of those officers who are serving at stations not the headquarters of their regiments."

* Regulations, 1889, par's 214 to 222.

† G. O. 105, A. G. O., Dec. 4, 1888.

4. "Department commanders will announce in orders annually the periods of the year to be given to practical instruction in tactics and other military exercises, prescribing the character of drills and the relative portions of time to be given to those of each character. These orders will conform to any instructions on such subjects which may be issued from the Headquarters of the Army, and to the nature of the service on which the troops are engaged."

5. "In order to insure uniform and steady progress, a general scheme of theoretical instruction for all arms of the service and special schemes for each arm will be prepared each year, and announced in general orders from the Headquarters of the Army."

6. "Upon the last day of September and March of each year, commanding officers of companies will forward to their regimental commanders reports showing the character and scope of instruction imparted during the previous six months, the number and kind of drills and number of recitations with average attendance thereon. Regimental commanders will forward abstracts of these reports, through department headquarters, to the Adjutant-General, for the information of the General commanding the Army."

7. "A regimental commander will inspect yearly, if practicable, those companies of his regiment which are not serving at his headquarters."

8. "In conducting the inspection, the regimental commander will thoroughly test the proficiency of both officers and enlisted men in practical and theoretical knowledge; and, upon its completion, will prepare and forward to the Adjutant-General, through the headquarters of the department in which he is stationed, a report, showing the proficiency of each company, the manner in which prescribed instruction has been carried on, the results obtained, and will add any recommendations he may deem proper to offer."

9. "Supplementary to Article LXIX.* of the Regulations, it is directed with the approval of the Secretary of War, that, when not prevented by active service, all the available infantry, cavalry, and light artillery of the Army shall devote a part of each summer to practice marches, encampments, manœuvres,

* Regulations of 1881: this article, "Troops in Campaign," is not embodied in the present regulations, but is to appear in a separate work.

6 *TRAINING THE ARMY IN FIELD DUTIES.*

and other field operations simulating the operations of actual war.

"For this purpose the available force of each division or department will be assembled in as large bodies as practicable, having due regard to economy and to the location of Indians who may possibly require control.

"Concentration will, in general, be made by marches; but in some cases, when the state of the appropriations will permit, infantry may be moved by rail to and from the places of concentration, for the purpose of joint operations with the mounted troops.

"Projects will be prepared in advance for each department, separately, or in combination with those of other departments, as the division commander may direct.

"The plans should embrace in detail, as far as practicable, for each body of troops, all the ordinary operations of active service for a command of its size and composition.

"These plans, accompanied by estimates for any additional funds which may be required, will, at a date sufficiently in advance of the field season, be forwarded by the division commander to the Adjutant-General, for the action of the Major General commanding the Army and the War Department."

In order that the system of training just outlined may be complete, orders should be issued from the Headquarters of the Army prescribing not only "a general scheme of theoretical instruction for all arms of the service and a special scheme for each arm," but also, to secure uniformity, the nature of the practical work and, perhaps, the relative portions of time to be given to that of each kind. The periods of the year to be given to the various kinds of practical instruction may properly be left to department commanders, following the rule that has worked so satisfactorily in the case of the season for small-arms firing.

GENERAL SCHEME OF INSTRUCTION FOR ALL ARMS.

An annual course of practical and theoretical instruction to be pursued at every military post is proposed as follows:

I.—PRACTICAL INSTRUCTION.

The practical military work of each garrison will be conducted in five periods designated respectively:

1. Individual season.

2. Company (troop or battery) season.
3. Firing season.
4. Battalion (squadron*) season.
5. Field season.

In accordance with paragraph 218 A. R., department commanders will announce in orders annually, not later than December 1st, the dates of commencement and termination of the several practice seasons, each of which will be continuous, as far as practicable, except the first, to which months not suitable for the other practical work may be assigned.

Commanding officers of companies, troops, and batteries will be responsible for the instruction of their commands during the first, second, and third periods.

Battalion and squadron commanders will be responsible for the results obtained during the fourth period.

The officer in command in the field will be responsible for the work done during the fifth period.

At posts where a full regiment may be stationed, at least two weeks will be devoted to its instruction as a unit, the regimental commander being responsible.

At posts where only one company of any arm may be stationed, the department commander will order such practical work for it, in lieu of that prescribed for the fourth period, as he may deem most advantageous.

During the first period at least five hours per week, and during the second and fourth periods at least ten hours per week will, when practicable, be devoted to the prescribed instruction—the hours to be designated by the post commander.

In addition to the practical work for the whole command, the following is ordered:

INSTRUCTION OF OFFICERS.

During the period from October 1st to March 31st, officers will be given practical instruction in the duties specially pertaining to their grade and arm of the service. This work will be under the direct supervision of the post commander who will arrange its details to correspond with the progress made in the theoretical instruction of his officers. At least four hours per week will be devoted to it when practicable.

* See "New Drill Regulations for Cavalry."

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INSTRUCTION OF NON-COMMISSIONED OFFICERS.

During the period from October 1st to March 31st, non-commissioned officers and such privates as may have been selected to receive theoretical instruction with the non-commissioned officers, as hereinafter provided, will be given practical instruction in the duties specially pertaining to the non-commissioned grades. This work will be regulated by the officer responsible, so as to apply as far as possible the principles taught theoretically. At least four hours per week will, when practicable, be devoted to this instruction.

II. THEORETICAL INSTRUCTION.

In accordance with paragraph 217, A. R., theoretical instruction will be given at least twice each week from October 1st to March 31st.

For this instruction the personnel will be regarded as consisting of three classes, as follows :

1. Officers.
2. Non-commissioned officers and selected privates.
3. The remaining enlisted men.

1. The officers will be assembled by direction of the post commander and under his supervision will receive theoretical instruction in the duties specially pertaining to their grade and arm of the service.

2. The theoretical instruction of the non-commissioned officers, and such other enlisted men as in the opinion of the company commander have sufficient capacity to profit by it, will be conducted under the supervision of the company commander, who will be responsible for the results obtained. If it is deemed advisable, however, the non-commissioned officers and selected men of all the companies of the same arm at a post may be consolidated by the post commander into one or more classes, and one or more officers specially detailed as instructors. Instruction will be given in the duties specially pertaining to the non-commissioned grades.

3. Theoretical instruction, to be obligatory for all other enlisted men, will be given under the supervision of company, troop, and battery commanders who will be responsible therefor.

III. SPECIAL INSTRUCTION.

Instruction in the duties of company bearers and in military

signaling and telegraphy will be carried on as already prescribed in paragraphs 1575 and 1761,* A. R., respectively.

IV. REPORTS.

In addition to the reports already required, the following will be rendered:

1. At the close of the battalion season, by battalion commanders responsible for instruction during the season, to regimental commanders, showing the character and scope of the instruction imparted, the number of hours practice with average attendance thereon. Regimental commanders will forward abstracts of these reports, through department headquarters, to the Adjutant General, for the information of the General commanding the Army.

2. Upon the last day of September and March, by post commanders, to department headquarters, showing the character and scope of the instruction imparted under their supervision during the preceding six months, the number of hours instruction, with average attendance thereon. Department commanders will forward abstracts of these reports to the Adjutant-General for the information of the General commanding the Army.

SPECIAL SCHEME OF INSTRUCTION FOR INFANTRY.

I. PRACTICAL INSTRUCTION.

a. OF WHOLE COMMAND.

The following is an outline of the instruction to be given to the infantry during the prescribed practice seasons:

Individual Season.—Special attention will be paid to the physical development of the men, who will be exercised for at least one hour per day during the season, Saturdays and Sundays excepted, in military gymnastics,—including setting up, walking, running, climbing, jumping, swimming, marching, with and without burdens; in the school of the soldier,—including the manual and bayonet exercise; and in the preliminary drills and exercises provided by "Small-arms Firing Regulations."

Company Season.—Thorough and progressive instruction will be given during this period for at least two hours daily, Saturdays and Sundays excepted, in the exercises of the company prescribed by the drill regulations,—including drills in manoeu-

* See Cir. 2, § V., A. G. O., 1890.

vre and battle tactics on diversified ground (paying special attention to the principles of attack and defense and fire discipline); dispositions as outposts and as advance, flank, and rear-guards, considering the company both as a separate command and also as a part of a larger force; patrol and reconnaissance duties; construction of hasty intrenchments and the preparation and utilization of other temporary shelter; crossing streams and passing defiles; and such other work of a similar nature as there may be time to undertake.

Firing Season.—Instruction to be given according to the requirements of "Small-arms Firing Regulations."

Battalion Season.—Thorough and progressive instruction to be given for at least two hours daily, Saturdays and Sundays excepted, in the exercises for the battalion prescribed by the drill regulations,—including drills in manœuvre and battle tactics on diversified ground (paying special attention to the principles of attack and defense and fire discipline); dispositions as outposts and as advance, flank, and rear-guards, considering the battalion both as an independent command and also as a part of a larger force; patrol and reconnaissance duties in connection with the foregoing; construction of hasty intrenchments, and preparation and utilization of other temporary shelter; crossing streams and passing defiles; and such other work of a similar nature as there may be time to undertake.

Field Season.—During this period all the infantry of each garrison, except the necessary guards, will when practicable, be ordered into the field for the duties prescribed by General Orders, No. 105, A. G. O., December 4, 1888. In the event of the concentration of the troops of a number of garrisons in a camp of instruction, or of the detachment of a command for service at encampments of the National Guard, commanding officers are enjoined to take advantage of every means offered by the journeys to and from such camps, whether made by marching or by rail, to carry on the contemplated instruction.

8. OF OFFICERS.

To be conducted as provided in the general scheme of instruction for all arms.

Problems in minor tactics will be practically solved on the ground; officers' patrols ordered, or duties of the kind required of them in actual war; reconnaissance, scouting, attack and de-

fense, contact, military sketching and topography, and such other work of the kind as there may be time to undertake,—will receive due attention. Each lieutenant will be required to make an extended reconnaissance, submitting, prior to March 31st, a sketch and report of the country passed over.

C. OF NON-COMMISSIONED OFFICERS.

To be conducted as provided in the general scheme of instruction for all arms.

The practical work will include reconnoitring, marching by the aid of sun and stars and by compass, map-reading, the making of simple military sketches with appropriate reports, and such other instruction of a similar kind as there may be time to undertake.

II. THEORETICAL INSTRUCTION.

To be conducted as provided in the general scheme of instruction for all arms.

1. At the prescribed meetings, officers will discuss professional subjects and solve problems in minor tactics, using maps of the country in the vicinity of the post (to be prepared if necessary) and such other maps as may be available. Lectures on military subjects will be delivered from time to time, each officer being required, if practicable, to give at least one during the six months. The details of this instruction are mainly left to the commanding officer who will be responsible that its object, viz.: the theoretical training of the officers in field duties for war,—is attained.

2. The non-commissioned officers and selected privates will be instructed in drill regulations, outposts, advance, flank and rear-guards, reconnaissance, scouting, and military sketching, field engineering, discipline and command, and such other subjects of a like nature as there may be time to undertake.

3. The remaining enlisted men will be instructed in drill regulations, discipline, duties of guards and sentinels, caring for themselves in the field, the history of the regiment, their present condition as compared with that of the soldiers of other countries and in former times, and such other subjects of a like nature as there may be time to undertake.

This instruction will be imparted mainly by lectures, though recitations may be required in drill regulations and in the duties of guards and sentinels.

SPECIAL SCHEMES OF INSTRUCTION FOR CAVALRY AND ARTILLERY.

It is thought unnecessary to go into the details of these special schemes. They should be of the same general character as that for the infantry,—the requirements of the arms receiving due consideration.

General Orders, No. 49, A. G. O., June 11, 1889, prescribes a special scheme of instruction intended primarily for heavy artillery. This does not come within the province of this paper and will be passed without remark, save that it is the only scheme that has yet been issued as provided by regulations, and is now serving beyond its time. It is highly important to the proper development of the system that the experience acquired each year be utilized in preparing for the work of the year following.

THE STAFF.

The peace duties of officers of the staff corps and departments are so nearly allied to their duties in the field in war, that the only portions of the staff requiring special consideration in connection with training the Army in field duties for war are the Battalion of Engineers and the Hospital Corps. The former, it is believed, is already receiving proper training and the work required of the latter during the field season operations of the line, added to that already being done in garrison, will result in a satisfactory state of efficiency.

PERSONNEL OF THE ARMY.

Preparatory to an attempt to show the feasibility of the proposed scheme and the results to be anticipated from its inauguration, it will not be out of place to consider the personnel of the Army, since the characteristics of the force to be trained, and the way in which it will respond to the efforts made, are all important factors in the possible issue.

The officers, with few exceptions, are men of superior education and ability, deeply interested in their profession. Many of them have had experience in civilized warfare, others have gained distinction in Indian campaigns, and not a few have had service of both kinds. Eighty-five per cent. of the line officers above the grade of first lieutenant are credited with service in the Civil War, and thirty-five per cent. of all officers of the line have had such service. All who have had no practical experience in war have

been required to show themselves possessed of the qualifications which promise to make efficient officers; and although there are failures in the military profession as in all others, no one familiar with the subject can doubt that the commissioned officers of the Army are competent to attain, and to cause the Army itself to attain, any standard of efficiency that may be prescribed.

With reference to the men, the Secretary of War, in his last annual report, says:

"I have been pleased to learn from many sources that enlisted men as a class are deserving of much commendation, and that in searching for faults to be remedied we often overlook the general intelligence and devotion which is their characteristic." The annual report of the Inspector-General for the year 1889, contains the following: "The character of the enlisted men is as a rule very good. * * * New men were generally young, active, and intelligent." "The tone and bearing of the enlisted men are constantly improving."

Less favorable, however, is the following extract from the same report:

"We cannot recognize too clearly that modern warfare makes enlarged demands upon the abilities of non-commissioned officers. * * * A certain deterioration in the instruction and abilities of our non-commissioned officers is reported—a serious matter in any service that attempts a perfect performance of military duty—and we cannot afford to admit or permit inferior quality in so important a particular."

The report suggests certain remedies for this unsatisfactory condition, at least some of which it is hoped will be applied. There is little reason to doubt that the efforts being made to enlist a better class of young men, coupled with the teaching in the Army schools required for certain men in their first enlistment and greater inducements to seek promotion to the non-commissioned grades, will result in an enlisted force entirely capable of satisfactory progress in military training and capable also of furnishing first-class non-commissioned officers.

THE SCHEME IN OPERATION.

The working of the proposed scheme can be illustrated in no better way than by showing how its requirements might be met the first year in a military geographical department situated as unfavorably as any other for out-door work.

The first step in its inauguration would be the designation by the department commander of the practice season. These need not be the same for all the posts in the department, and the recommendation of post commanders, as to the most suitable months for the various exercises prescribed, may be necessary to insure the best results. The field season, however, should be the same for all posts in the department, and, perhaps, in the division, unless it is known that the state of the appropriations will preclude concentration.

For one of the posts, the following designation might be made:

Individual season; January, February, and March.

Company season; April 1st to May 15th.

Firing season; May 15th to July 15th.

Battalion season; July 15th to September 1st.

Field season; September.

Individual season; October, November, and December.

Much of the individual training can be conducted in-doors, hence the individual season should include the winter months, when out-door work is usually impracticable.

At the post in question the period from October 1st to March 31st would be devoted to:

1. Individual training.
2. Theoretical instruction of officers.
3. Theoretical instruction of non-commissioned officers and selected privates.
4. Theoretical instruction of remaining enlisted men.
5. Practical instruction of officers in connection with theoretical work.
6. Practical instruction of non-commissioned officers and selected privates in connection with theoretical work.

From April 1st to September 30th, the work would be practical and for the whole command.

It is thus seen that while the "individual season" covers six months, a great deal of other work belongs to the same period, while during the other four seasons no additional work is prescribed.

It would be desirable to have the company, battalion, and field seasons follow one another in the order named, without the intervention of the firing season, but as a rule this would be impracticable.

Time to be Devoted to Training.—During the company and battalion season, the time to be given to instruction would rest almost entirely with the post commander, the only limitation suggested being the minimum of ten hours per week.

In the field season, of course, much more time would be required.

The firing season needs no discussion so far as the time given to practice is concerned.

During the remainder of the year, the proposed requirements would keep every one fairly well occupied. A company officer, for example, would be employed from twelve to fifteen hours per week in giving and receiving instruction, besides the study necessary for preparation and in addition to his ordinary garrison duties. A non-commissioned officer would receive at least eleven hours' instruction per week besides the study necessary to progress in his theoretical work, his duties as drill-master, perhaps, and his ordinary garrison duties. A private, in addition to his other duties, would receive at least seven hours' instruction per week.

To those who favor the application of the eight hour per day system to the training of the Army, the time required by this scheme will seem altogether insufficient. It is not believed that it will prove so in practice. In order that interest may be kept up and satisfactory progress made, it is quite essential that the system of training shall be far removed from anything resembling a "perpetual grind."

Theoretical and Practical Instruction of Officers.—The efficiency of the Army is largely dependent on that of its officers, not only because their own training regulates that of their men, but also because they are relatively a permanent part of the Army, while the remainder of the personnel is ever changing, trained soldiers being replaced by raw recruits.

In the winter of 1887-88, it was the writer's good fortune to be stationed at a post commanded by an officer of great practicality, wide experience, and unusual military attainments. Upon the approach of winter, a circular was issued informing the officers of the garrison that thereafter, on Monday evening of each week, they would assemble at the adjutant's office to discuss military subjects and solve practical military problems.

At the first meeting the commanding officer delivered an interesting lecture on the system of tactics employed by Frederick

the Great. But this was simply an introduction to more practical work. At the next meeting short papers were read by several officers on the subject previously announced—"What changes, if any, are desirable in our present system of Infantry Tactics?" A discussion followed in which each officer present was called upon to participate. The next subject was of the same nature, substituting *cavalry* for *infantry*. After this third meeting, still more practical work was taken up. Maps showing the topography of the military reservation were available and a problem was announced about as follows:

IDEA.

A column is marching from A— towards B— on the North Road. Its advanced guard, consisting of four companies of infantry, a troop of cavalry and two guns, has arrived at C—. An opposing column is marching from the South along the same road. Its advanced guard, consisting of two troops of cavalry and two guns, has arrived at D—. (The roads and points indicated were the principal roads leading to the post and prominent points in the vicinity, familiar to all.)

PROBLEM.

1. Estimate the size and composition of the main bodies of the opposing forces.
2. What dispositions would be made by the advance guard commanders?

Each officer was required to study the problem and be prepared with a solution to be given either verbally or in writing.

Another practical problem was the following:

IDEA.

A regiment of infantry is stationed at this post. Present for duty: 25 officers, 800 men. At six o'clock P. M. the commanding officer receives a telegram ordering him to report with his command for field service to the department commander at the court-house at K—, as soon as practicable, carrying rations for the trip only, proceeding via D— (a point on the railroad ninety miles distant), and thence by rail. Minimum number of officers and men to be left as guard of public property at station.

PROBLEM.

1. What steps would be taken by the commanding officer to comply with this order?

2. What would be the duties of the staff, regimental and post?
3. What would be done by the company commanders and lieutenants?

The solution of this problem in detail required study, and hard study at that, on the part of the younger officers at any rate, including the orders to be issued, showing the guard to be left, the number of days' rations to be provided, the equipment and clothing to be taken by the men, the amount of tentage and baggage allowed officers and men; the number of wagons required and the manner of procuring extra wagon transportation; the amount of forage for transportation and other animals; the order of march; the manner of camping; the camp guards required; the number of days to the railroad; the number of freight and passenger cars for the railroad trip; the "embarkation" of the troops; the rate of travel of the train; the "debarkation" at the end of the journey; the march through the streets of a city, etc.

One officer sent a telegram to ascertain officially the capacity of the passenger and freight cars ordinarily used on the railroad over which the trip would have to be made.

And so was the work continued amid growing interest and enthusiasm. Other practical problems, involving the topography of the country in the vicinity of the post, were solved. Situated at the confluence of two streams, at times unfordable, bridges were assumed to exist at certain crossings, the streams being impassable elsewhere. Officers were constantly, and of their own volition, making reconnaissances of the country to aid in the solution of the problems proposed. Never was a winter at a frontier garrison passed more profitably by officers of the Army. All who were fortunate enough to receive this instruction can now see how it might have been extended and improved upon. Scientific subjects of a military nature were occasionally discussed, forming an attractive and eminently instructive variation of the ordinary work.

The scheme proposed contemplates instruction somewhat similar to that just described, but much more systematic and comprehensive. Much is left, as it should be, to the post commander, who would be responsible for the progress made and would be careful to carry on the instruction in such a manner that his report would compare favorably with those from other posts.

Theoretical and practical instruction of non-commissioned officers and selected privates.—"The non-commissioned, as well as the commissioned, officers of the whole battalion might be assembled for instruction and not be left always to the varying efficiency and hobbies of junior company instructors. * * * There is always some officer at the post capable of giving non-commissioned officers efficient and necessary instruction and tone, and a class so assembled becomes worthy of his zealous efforts to instruct them."*

The question now arises whether or not all the non-commissioned officers and selected privates should receive the same kind and amount of instruction? It will usually be found that there is a vast difference in intelligence and capacity among the men forming this class, and that after all have been trained in the duties they will be required to perform in the field in time of war, a selected few may well receive more advanced instruction. Those who are competent could easily be selected by the officer in charge and recommended for transfer to the higher class. This would produce a spirit of emulation which might be further increased by having the qualifications of the soldier noted on his discharge.†

Theoretical instruction of remaining enlisted men.—This instruction given under the direction of the company commander (probably by a lieutenant), consisting mainly of lectures, is capable of vastly improving the service.

Recitations in the "School of the Soldier" and in the "Manual of Guard Duty" would add to the efficiency of the command, and lectures on discipline, the history of the regiment, and the present condition of our enlisted men as compared with that of the soldiers of other countries and in former times, would foster pride in the regiment and tend to make the men satisfied and contented.

Individual season.—During this season the soldier should be thoroughly trained in the duties he will be called upon to perform individually, and special attention should be given to his physical development. This would also be the time to conduct the preliminary drills and exercises provided by "Small Arms Firing Regulations," including sighting drills, position and aim-

*Report of Inspector-General, 1889, p. 16.

†See Von Scherff's "The New Tactics of Infantry" (Graham's Translation), pp. 172 to 189.

ing drills, estimation of distances and gallery practice,—those armed with pistols receiving instruction also in their use. The men of all arms of the service should be made thoroughly proficient in the school of the soldier, and cavalry, wherever practicable, in the school of the soldier mounted. At posts provided with riding halls, complete instruction in this last school could be given. Besides the manual and bayonet and sabre exercises, practice in attack and defense, with buttoned bayonets and wooden sabres should be given; and masks, plastrons, and gloves should be provided for the protection of the men. As far as practicable, gymnasium work should be made a part of this individual training, each post being furnished with a suitable outfit and a competent officer specially detailed as instructor. Walking, running, climbing, jumping and marching, with and without burdens, should comprise a part of the training. Swimming (with horses, also, for mounted troops) would have to be left for warm weather, and might be taken up advantageously during the firing season. Practical instruction in the care of arms, accoutrements, and equipments (and, for mounted troops, of horses) belongs to this period; and every man should be made so familiar with the trumpet signals as to be able to name them instantly when heard.

Company season.—At the end of the individual season, the company commander should be able to begin his drills in manœuvre tactics with his men in admirable condition for this instruction. The special scheme shows, in general terms, the results he would be expected to attain. The manner of attainment should be left to him alone, his responsibility being sufficient surety that his work will be well done.* His object should be to present his company to his battalion commander at the beginning of the battalion season in just a little better shape for the work of that season than any other company.

Firing season.—The next steps in the scheme for training would be "Individual Practice at Known Distances and in Skirmish Firing" and "Range or Field Practice of the Company as a body,"† with the prescribed firing for troops armed with the pistol. While some improvements are needed in skirmish and field practice firing, the present system for small arms is so ad-

*See remarks on *individual initiative* in "The Training of Infantry for Battle." Ordnance Notes, No. 272.

† "Small Arms Firing Regulations," p. 2.

mirable as a whole that no changes need here be suggested. The needed alterations will naturally be made in due season as a result of further experience, and in the meantime the present course answers every purpose.

During this season, the light artillery firing practice should be conducted in accordance with the requirements of the special scheme for that arm.

Battalion season.—Beginning with manœuvre drills, the battalion should be carried through a course of instruction similar to that outlined in the special scheme, the object of its commander being thorough preparation for the work of the following period.

The remarks in regard to the "individual initiative" of the company commander apply also to the battalion and other commanders.

Field season.—The work of the previous seasons would make it possible for the greatest benefit to be derived from the concentration of troops in large bodies for instruction in the operations of actual war. Should the state of the appropriations not permit the necessary concentration for these manœuvres, the troops of each post (as is now done) would be ordered on practice marches or into small camps of instruction.

In any case, it is believed to be of the greatest importance to occasionally combine the units on a peace footing, forming, simply for purposes of instruction, commands at war strength.

If there were reason to apprehend the survival of the policy pursued during the Civil War of continually forming new regiments for the sake of officering them by politicians, there would, perhaps, be no reason for carrying out the idea suggested. But if the national forces are to be organized on the model of the Army, and units kept at the prescribed strength, much benefit would be derived from forming companies and battalions at war strength for specified manœuvres. This can be done during the field season better than at any other time, and any disadvantages are insignificant as compared with the good that would result.

ADVANTAGES.

The proposed scheme is believed to possess the following advantages:

1. It is eminently practical (in the sense that it is capable of

being carried out) for it is in perfect accord with existing provisions and requires for its inauguration simply the issue of the orders contemplated by regulations.

2. It is not burdened with details, but states in general terms the results required, leaving the methods to be employed largely to the discretion of the officer responsible for the instruction. This plan has been followed, not only because minuteness of detail in any system of training for the Army proposed by one officer would necessarily result unsatisfactorily; but also, and quite as much, because the study and thought necessary to produce the required results in the best possible manner, will, in themselves, constitute an effective training school for officers. When the method employed by any one officer is found to be particularly effective, it will speedily be adopted by others; and in the end, the system best adapted to the different organizations will come into general use. The best test of a method is the result obtained from its application.

3. It is subject to annual modifications whereby the defects always existing in an untried system can be conveniently remedied.

4. It provides for systematic progress in practical and theoretical training from the physical development of the individual soldier to the field manœuvres of the combined troops of a military geographical division.

RECRUITS.

The manner of obtaining recruits does not form a part of the subject under discussion; but having obtained them, the question of their instruction becomes of vital importance. The necessity under the present system of recruiting, of sending the new men to their regiments at no stated season and often in several detachments during the year, is a disadvantage: another is the variable length of time they are kept at the depots. But unless these disadvantages can be overcome, the present system of instructing recruits is susceptible of little improvement. There is no doubt that in the past the small number of men "for duty" has often resulted in recruits being taken up for duty before receiving sufficient instruction. With larger garrisons and less labor for troops, this undesirable necessity will naturally cease.

In the proposed scheme, it is assumed that the instruction of recruits is carried on as at present.

CONCLUSION.

In conclusion it may be said that a perfectly satisfactory system for training the Army in field duties for war can only be obtained by a process of evolution. The experience acquired each year must be utilized in modifying the details for the year following and these modifications should be embodied in the general and special schemes to be issued from Army headquarters.

Just as the present system of small-arms practice has grown from the comparatively inefficient one of ten years ago, so will a highly efficient system of training in field duties for war be evolved from the one first established, now that the necessity for such training is becoming recognized.

A PROPOSED CHANGE IN ARTILLERY SCHOOL METHODS.*

BY FIRST LIEUT. C. H. HUNTER, U. S. A.,

FIRST ARTILLERY.

IN this paper I shall attempt to show that the system of instruction at Fort Monroe can be improved without additional legislation or expense; that the improvement is needed; and that it cannot come by any development of the idea upon which the school is founded.

Mr. Bryce, in his "American Commonwealth," tells us that, in making the Constitution of the United States, our forefathers had some known and some unknown quantities to work with, and that the resulting instrument showed, as time went on, and its various provisions were put to the test, that the theoretical part of this instrument, if we may call it so, was by no means equal to the expectations formed by its makers, while the part founded on experience has stood the test of time. This is an illustration of a truth that has never been more necessary than now to remember in connection with reform in army matters. While foreign nations, spurred on by imperious necessity, have been developing their military establishments to a hitherto unknown extent, our officers have been looking at them with admiring eyes; and with the spirit of imitation, always strong in this country, but especially so in the Army, have been writing and thinking of the best way to bring our Army into correspondence with theirs. To do this would be impracticable; to attempt it, injudicious. Human nature may be the same all the world over, but national characteristics differ widely. Though we should study our neighbors' systems, and extract the good from them, we should not forget the altered circumstances, when we come to apply them. Now, while I agree with Mr. Bryce that sudden innovation is generally undesirable, I hope to show that what seems innovation in the scheme proposed, is merely the application of methods known and tested in other educational establishments.

* Read before the West Point Branch, M. S. I., Thursday, Oct. 16, 1890.

If we want to make any improvement that will stand the test of time, it must be in a development of our own, one suited to the character of our Army. While the older men hold to established incumbrances, our younger men care nothing for experience or history, in their desire for some ideal system. We should, therefore, work upon actual experience. Two examples of military educational establishments will come to the minds of all officers; the military academy, and the post-graduate schools; and we may call the ideas upon which they are based, the "faculty" or "board" system, and the "post" system. The former we see here, the latter at Fort Monroe; for though theoretically the board system applies at the Artillery School, practically it is swallowed up in the post.

To produce any good results, there must be a germ idea that will bear development. Now, is the fundamental idea of the Artillery School capable of the development necessary at this time? I shall endeavor to show that it is not. The natural way of building is to use materials on hand, but the scaffolding should not be made to take the place of the structure itself. In the beginning it was proper to adopt the post idea, as it was the only one we had for starting a school, but now we have outgrown it.

Without any intention of criticising unfavorably the past or present instructors at Fort Monroe, it will occur to any one that the mere detail of a battery does not, *ipso facto*, render its captain an authority on some special subject. And yet this is the present system, and that it has worked as well in the past as the results seem to prove is a notable instance of the power of the American to adapt himself to circumstances. Much might be written to prove what to most artillery officers needs no proof, but the mere fact of the existence of such a system will show that change is necessary.

To those who may not know the organization of the Artillery School, I will say that the school is a post, commanded by a field officer of artillery, who has under him other field officers of the same arm, these three or four forming a staff with duties ostensibly like those of our academic board. One or more batteries from each regiment are ordered there, the captains acting as instructors. There are a few other artillery officers there, who aid in the instruction. The lieutenants, student-officers, who are of all ages and capacities, do the ordinary garrison work, and their time is largely taken up by the ordinary post duties. The post

idea is at the bottom of the school, and has the effect that might be supposed. Garrison details are made part of the instruction of men gray in the service, and the duties which it would be proper to teach new appointments are given to veterans to improve their minds.

The plan that I have to propose to-night is founded upon the actual necessities of our profession, and is based on the *board* or *faculty* idea, as far as the higher education is concerned, and on the strict *post* idea in respect to the lower.

I.

The post and school should remain at Fort Monroe, with a field officer of artillery in command. One battery of each regiment should be sent to form the garrison, the captains acting as instructors to the first class of officers, hereinafter mentioned, in addition to their ordinary garrison duties. The school should be divided into three distinct branches: one for the education of officers recently appointed to the artillery arm, in the duties incident to their ordinary work as junior subalterns; another for the instruction of artillery recruits; these two branches to be under the sole orders of the post commander; the third, a real post-graduate school, for the higher education, this last to be under a board or academic staff.

The officers attached as students should therefore be of two distinct classes. The first class will be composed of new appointments to the service, graduates of the Military Academy or otherwise, who should be sent to the school as soon as commissioned, and attached to one of the batteries there for instruction by the captains of these batteries. With the captains they would form the officers' part of the garrison, and would do ordinary duties in addition to others to be mentioned. Their term of service should be one year. They should have no studies other than tactics, but should be drilled thoroughly in the practical duties of their positions as second lieutenants, and not as commanders of regiments. They should be required to master thoroughly all the drills and mechanical manœuvres of the pieces, the various foot drills and the rules for target practice in both large and small arms. In addition they should be required to act as company clerks until all the company papers are familiar, and by details as post adjutant, they should acquire a fair working knowledge of the post papers. They should also be required

to do the drilling and teaching of the recruits who are mentioned in the next section. All officers will admit that the average second lieutenant joins his regiment in a state of utter ignorance of the *a b c* of his duties, and under a lax system is often left in partial ignorance for years. Every officer in the artillery will admit that a knowledge of even the obsolete ordnance we have, is often lacking on account of the absence of such ordnance from artillery posts. By using the method suggested we could at least have a well-instructed subaltern at the expense of a year's education.

But, it will be objected, why make this a course requiring special instruction at a school? Should not all this be taught at the ordinary post? It should be, certainly; but is it? One of the trials that political and other organizations have to endure is that there are always reformers who scorn any scheme of improvement that is not based upon an ideal state of things. Attributing to the average man the qualities possessed only by those very much above the average, they neglect the ordinary small improvements within reach, and long to arrive at some consummation devoutly to be wished, but never attained. An educated young officer is at least better than an uneducated one, and under a course of instruction such as the one described, and carried out rigidly under one head, he should be perfectly competent to fulfil all ordinary requirements.

II.

The second branch of the school should be that of instruction for recruits. These should be sent to fill the batteries (which could gradually be made skeletons), and trained for at least six months in their duties, having at the same time such simple English education as might be necessary. The instructors should be the captains and lieutenants above-mentioned. Artillery work is becoming more and more complicated, and requires daily a higher order of intelligence and education. Assuming Fort Monroe to be well provided with necessaries for this instruction, the same remark as to results will be partially applicable that was made in the preceding section.

Lack of space prevents my going into this part of the subject more than above. The value of a trained recruit is so much greater than that of an untrained one, training can be so much better given by a regular system than by any other means, that

this method of instruction seems better than the one we have, especially as the recruits required for the artillery are presumably fewer than those of the other arms of the service.

Before leaving the first branch of the school, the lieutenant should be examined by a board ordered by the post commander, and his proficiency attested. A lack of knowledge should send him back for another year. He then goes to his regiment, stays there three or four years, sees something of the world, recovers from the weariness of books which he probably had when he was graduated from West Point, *orients himself*, so to speak. Then he should be sent back to the school, but for a different purpose, and with an entirely different status. This brings me to my third division of the school.

III.

This division, the real school for higher education of artillery officers, should be separated completely from the post as regards duties. The officers should be sent for a two years' detail, and to a course of hard, systematic study. He should be under the order of the commanding officer for necessary discipline, should be supplied with quarters from which he cannot be moved, and excused from all post duties. He should not be required to attend any drills other than those which bear directly on the course. Let us leave him there, and see what changes should be made in the instructors and methods of instruction.

The present staff should be abolished. A faculty, modelled somewhat after our own Academic Board, but, though possibly permanent, not resident, should be established in its place, the commanding officer to preside *ex officio*. This board should consist of instructors detailed by the War Department from the officers of all corps. These instructors are not to be stationed permanently at the school, but are to be selected and sent there to give such a course of instruction as the Department should see fit. There should be no difficulty in finding specialists, as the field for selection would be a wide one. After an instructor had finished his course, be it a week, a month, or six months, he should be relieved, and another one sent. No one's rank should be so high or so low as to exempt him from detail. The Government should set apart a suitable house, properly furnished, for the residence of such instructors, sending one or two at a time. They should give their instruction by lecture or other-

wise, as is deemed best. Time for due reading upon these subjects should be given, and each student-officer should be required to submit a thesis upon some subject in each course, the school press printing all such theses, and distributing them to every officer in the Army. Unless Dogberry's desire to be writ down an ass is prominent in the writer, some pains will be taken.

At such intervals as the War Department deems necessary, examinations, oral or written, should be held; one for graduation should be required. At this examination, the board, consisting of all the instructors, should assemble, with such inspectors as are desirable, to examine the two years' work, and make such recommendations as it thinks fit. The result should be transmitted to the War Department, and publicly announced. The law which requires examination for promotion could be brought into play here, and an officer unwilling to take the trouble to do at least a respectable amount of work, would find his occupation gone very soon. He should be sent back for another two years' course, and then, if he failed, he should be retired in some manner.

The kind and amount of instruction to be given is a subject of the utmost importance, but I do not feel competent to discuss it *in extenso*. Besides the artillery course proper there should be given a knowledge of grand tactics and strategy such as would be likely to be employed by a brigade commander; the complete raising, arming, equipping, feeding and commanding a company and regiment of volunteers; a knowledge of the methods of equipping sea-coast and siege batteries; the shipment of heavy guns; electric, and as much engineering as would suffice to build the ordinary short bridges; in fine a complete course of practical instruction such as could easily be laid down by the War Department and easily be taught by the various experts in our service.

To go back for a moment to our student. Settled for two years near a good library, in a good climate, with enough amusement and life to keep his social faculties from stagnation, he would hear daily men eminent in their own profession. He would learn from what books to seek information, and would have a chance for original research in many directions. In practical work—and study without practice produces little good—he would follow up his studies with modern ordnance, with modern steam and electrical machinery, with modern implements for moving and shipping heavy ordnance.

I think the advantages of this system over the present one are almost too manifest to need formal enumeration. The wide field for selection, the prestige that special knowledge always gives a teacher, the eminently practical nature of the instruction possible under this system, the unpleasant results that would come from a formal judgment of a body of men of great special attainments that a candidate was unable or unworthy to remain in the ranks of his profession, would certainly produce great effect.

I have to offer in support of the plan suggested in this paper, that it will cost little, need no legislation, and that it is not an experiment in an unknown field. A single order from the War Department could work this reform in a system, that, as it now stands, is productive of small educational results at an unnecessary outlay of time, money and energy.

That this sketch is imperfect, I am well aware. It is scarcely more than a hint of an improvement that seems to be worth while. I labor under the disadvantage of having been away from the Artillery School for four years, and I may have stated as facts some evils that have ceased to exist. I am convinced, however, that in the main the evil of the system is there, and I am also convinced that the system will bring evil with it.

MODERN BOBADILISM OR THE MARKSMAN'S METHOD OF DEFEATING AN ARMY.

BY CAPTAIN JAMES CHESTER, U. S. A.,

THIRD ARTILLERY.

CAPTAIN BOBADIL was a creation of rare Ben Jonson. He was a coward, a knave and a braggart of the Ancient Pistol order, and like him pretended to be a soldier, a hero and a philanthropist. He had a theory, based upon his own personal prowess, which was calculated to diminish the horrors of war and greatly curtail its cost. He never doubted the basis upon which his theory was built, nor lost an opportunity of advertising its excellence. Fighting was a mere pastime to him, and he declared his readiness to undertake that disagreeable duty for the State upon the easiest kind of terms. Bobadil was a reformer, and his specialty was the Art of War. He proposed to reform that Art in a way that would reduce the disagreeable features of fighting to their lowest terms, and his plan for doing so became known to the world as "*Captain Bobadil's Method of Defeating an Army.*"

Bobadil enunciates his plan thus: "I will tell you, sir, by way of private and under seal; I am a gentleman and live here obscure and to myself, but were I known to Her Majesty and the lords,—observe me,—I would undertake, upon this poor head and life, for the public benefit of the State, not only to spare the entire lives of her subjects in general, but to save the one-half, nay three parts of her yearly charge in holding war, and against what enemy soever. And how would I do it, think you?"

"Why thus, sir. I would select nineteen more, to myself throughout the land; gentlemen they should be of good spirit, strong and able constitution; I would choose them by an instinct, a character that I have; and I would teach these nineteen the special rules, as your punto, your reverso, your stoccata, your imbroccato, your passada, your montanto; till they could all play very near, or altogether as well as myself. This done, say the enemy were forty thousand strong, we twenty would come

into the field the tenth of March or thereabouts ; and we would challenge twenty of the enemy ; they could not in their honor refuse us. Well, we would kill them ; challenge twenty more, kill them ; twenty more, kill them ; twenty more, kill them too ; and thus would we kill every man his twenty a day, that's twenty score ; twenty score, that's two hundred (*sic*), two hundred a day, five days a thousand ; forty thousand, forty times five, five times forty, two hundred days kills them all by computation. And this will I venture my poor gentleman-like carcass to perform, provided there be no treason practiced upon us, by fair and discreet manhood ; that is, civilly by the sword."

That there are flaws in this plan is frankly admitted ; probably Bobadil is the only man that ever denied it. Still there was some plausibility in it, in an age when the wager of battle was a recognized method of determining questions of fact. Disputes between individuals were settled in this way, and why not disputes between states ? Why should a powerful state be permitted to overwhelm a weak one ? If they must fight, let them select their champions, fight according to rule, and abide by the issue. There seems to be plausibility in that, too, which in Bobadil's day, must have looked like the eternal truth itself. Indeed the wager of battle was almost an every-day occurrence in those days. We have a very fine description of one from the pen of Walter Scott. He says that the Clan Chattan and the Clan Kay had been at deadly feud for many generations. To quench the feud, and settle the question of clan superiority, a certain number of men from each clan agreed to meet in mortal combat on the Inch of Perth. The battle was fought in presence of the king with all the solemnity of a legal proceeding, and at its close judgment was pronounced. But it settled nothing. The judgment was ignored by the losing side, and the feud went on more bitterly than ever. So Bobadilism, even in those ancient days, failed in practice.

But failure in practice rarely kills the theory of a crank. Bobadilism, with all its essential ear-marks, has reappeared. It is not so conspicuous, perhaps, as it once was, but it is young yet, and too modest to be aggressive. It is content for the present to wear the honors and fatten upon the flattery awarded it ; but it is Bobadilism for all that, and may formulate a theory any day.

When the modern Bobadil lays his plan before the public, he

will be found to have the same purpose as his prototype. He will propose to simplify the art and lessen the horrors of war in a scientific way. The cost and the carnage of battle will, of course, remain. Blood will be shed, and money will be spent more lavishly than ever; but the killing will be done in a scientific manner by the skillful manipulation of arms of precision at distances beyond the range of distinct vision. It is the shock of battle, the delirium and turmoil of colliding masses, which brutalize a battle-field, that the modern Bobadil will propose to eliminate. Battles, according to his theory, will be decided without shock. Battalions and companies will no longer be units on the line. They will be retained for administrative purposes only. The line of battle will consist of a line of men in easy open order, and the battle will be a contest in marksmanship. Commanders on both sides will stake the issue on the marksmanship of their men. Manœuvring will be unnecessary, and generalship will be eliminated from the art. Hostile lines will approach each other until they are within effective range. The men will then lie down, taking the prone or back position, or the "Texas Grip," as each individual may elect, and the battle will begin and proceed like a contest at Creedmoor, minus the markers and scorers. Officers will have little or nothing to do in such a contest, except to attend to supply, and see to the dead and wounded. A battle will thus become in fact, what it has always been in popular conception, a contest in killing. If both sides are equally skillful and courageous, the end may be mutual annihilation. In any case the battle must be tedious and monotonous, but it will be a trial of skill and not an exhibition of ferocity.

The battle according to the new theory must continue until one army is annihilated or "throws up the sponge." It is difficult to conceive how it could be terminated otherwise without resorting to the shock, or invoking the action of an umpire; but with such a functionary and a perfect set of rules, the battle might be terminated after, say, a week's practice. Correct lists of killed and wounded might be kept by disinterested parties, and at the end of the battle a balance might be struck and the victory awarded accordingly; or the losing army might be annihilated, in a certain number of days, by computation. Of course there might be an appeal from such a decision, in which case the only alternative would be a continuation of the contest, until one army was

actually annihilated, as in the case of a cocking main. Indeed this would be the natural termination of such a contest, although the intervention of an umpire at the end of a fixed period would be more in accordance with civilization, not to mention humanity.

Ancient Bobadilism was the offspring of individualism. It was the natural consequence of the spirit developed in the jousts and tournaments of chivalry. The knights of chivalry are the prototypes of the marksmen of to-day, and the lists of old are the counterparts of our rifle-ranges. Distinguished champions of the olden time travelled from tournament to tournament prepared to fight with any qualified champion who might enter the lists against them, and in this way earned abundant fame and a scanty livelihood.

Modern Bobadilism is very like its prototype. Sprouting from the same seed, it has been fostered by the same kind of favor, and stimulated by the same kind of reward. Perhaps it deserves the laurels which it wears with becoming modesty. We have no fault to find with the laurels *per se*. But the lesson which they teach, the spirit of individualism which they foster, must be ruinous to discipline and destructive of that plastic coherence, without which any army must be unmanageable. Individualism is the enemy of discipline, and the antidote of organization. It recognizes no merit in combination, and no science in war. The art of rifle shooting is the Art of War in its estimation. It believes that an army of marksmen would be invincible; that cavalry and artillery are unnecessary adjuncts to an army; and that strategy and tactics are old-fashioned fads. And there is no telling how soon it may formulate a theory founded upon these ideas. It believes with ancient Bobadil, that war is simply a contest in killing between two nations, and that victory belongs to him who kills the most. And these assumptions are all the more dangerous because they harmonize with popular belief. It is the marksman and not the soldier whom the nation delights to honor. Perhaps it thinks the marksman's badge is evidence that the wearer is a soldier tried and true. Perhaps it would be heresy to think otherwise. Still there is something Pickwickian about the marksman's badge. If it were not Pickwickian it would be unlovely. The soldier who cut a notch in his gun-stock every time he killed an enemy, has never been considered a lovely character. Yet these notches were evidence of genuine marksmanship. There was nothing Pickwickian about him. He was

a military marksman pure and simple, and he has always been classed with his brother barbarian, who vouched his skill by the scalps of his victims. Strange, is it not? The sham marksman is decorated, the real one is detested.

Again, the pot-hunting proclivities which individual marksmanship tends to develop in the soldier, are worthless in war. "All quiet along the Potomac to-night," was a true report, although a lonely picket had just been murdered by a pot-hunting enemy. The war was no nearer its end for that solitary death, nor would it have been if ten thousand sentinels had so fallen. Such barbarism only arouses the savage which sleeps in the heart of every soldier, and tends to prolong a war and make it bloodier. Good soldiers are not pot-hunters. The rebel picket who presented arms to General Grant at Chattanooga was not a pot-hunter. The savage was sound asleep in his heart, so sound that all the turmoil of lawful war had been unable to awake him.

There never were better soldiers, or more bitter enemies arrayed against each other, than the French and English in the Spanish Peninsula in 1813. They had been fighting each other in that theatre for over five years, and some of their battles were the bloodiest, even of that bloody age. But there was no pot-hunting. Cold-blooded military murder was never resorted to. The soldiers respected their enemies. In this connection some interesting anecdotes are related. Napier, in his xxiii. book, states that while the 43d Regiment was preparing to advance, a French sentry within twenty yards coolly walked his beat in perfect confidence as to his personal safety. Indeed he was so satisfied of his safety that he removed his knapsack to ease his shoulders. And his confidence was not misplaced. When the regiment was ready to advance, an English soldier stepped forward and helped him to replace his pack, so that he might get out of the way before the firing began. On another occasion when Lord Wellington desired to drive the French from a certain hill in the neighborhood of Bayonne, he sent the riflemen who constituted his escort to take possession, which they accomplished in the following manner. Stealing up to within very short range of the position, one of the old soldiers raised the butt of his rifle and tapped it several times. At the signal, which seemed to be well understood, the French withdrew without firing a shot. The signal meant: "We are strong enough to take this position, and we must have it." And, the historian adds: "The signal would

never have been made if the post had been one capable of permanent defense, so well do veterans understand war and its proprieties."

Now, modern Bobadilism is calculated and intended to abolish all these proprieties. It tends to arouse the sleeping savage in every soldier's breast, and civilization will have to suffer for it. Individualism in the ranks is the most dangerous element that could be introduced into modern war. It is inconsistent with discipline and detrimental to efficiency, and would convert any army into an armed mob;—unless indeed the old-time "wager of battle" is to be revived, and national disputes are to be settled in the old-fashioned way, by chosen champions. Then, indeed, modern Bobadilism would find its field of action. Not only would it lessen the horrors of war, but it might be made to abolish bloodshed altogether. If the ancient Bobadil could kill his enemies by computation, the modern Bobadil might destroy his by demonstration—a method which could not be objectionable even to the most advanced peace-at-any-price Quaker societies. Suppose, for instance, a dispute arose between two nations, which, according to the old methods of procedure, would have to be settled by the sword. According to the modern method, each side might select an umpire, and the two thus selected should agree upon a third. To the committee thus formed, the score-books of a hundred, or a thousand, *bona fide* marksmen of each side might be referred, and after balancing them up, the committee should decide the issue. Then, indeed, Bobadilism would be beneficial. There would be no bloodshed, no camp disease, no boiling of the haversack for soup. The horrors of war would be altogether abolished, strategy would become a lost art, tactics would be forgotten, and war would become a bureaucratic business altogether. Then, perhaps, the millennium would begin.

But the world is hardly ripe for the millennium yet. When a warlike nation gets thoroughly aroused, nothing will satisfy it but blood. Bobadilism on the demonstration plan would yield no satisfaction. The cocking-main method would be more in accord with such a nation's humor, and all the evils of individualism would thus blossom on the battle-field. Modern Bobadilism believes that battles can be won by individual marksmanship, and the belief is likely to affect the tactics of battle in the near future. We are entering on an era of soldier's battles, in which

the Art of War will be superseded by the art of rifle shooting, and battles will be won by the accidental efforts of the men in the ranks.

If that be true, surely the American Bobadil ought to rejoice. We have an army of marksmen, and if Bobadil's theory be right, we ought to be invincible. But there is a horrible possibility behind that word "if," which it takes some courage to enunciate. Let us look at the pros and cons of the matter. Bobadil says the modern musket is a grand weapon, and it certainly is. He says it has immense range and extraordinary accuracy, and it certainly has. He says that a marksman armed with such a musket can hit his mark twice out of three times at six hundred yards, and he certainly can. And he says that no line could live before such men, and such muskets. Well, perhaps; but that assertion is not so well supported as the others. It overlooks some very important elements in the problem. Excitement, rashness, nervousness, weakness, timidity, and even cowardice are liable to be developed, even in marksmen, by the hardships which precede, and the dangers which attend line of battle work. How are we to estimate the value of these factors, some of which are sure to be present. It would be madness to expect the calmness and deliberation of the rifle range on the line of battle. Marksmen are not exempt from any of the weaknesses of human nature. What modulus then shall we use to reduce the work of the range to the work of the battle-field? In other words, what is the battle-value of individual marksmanship?

The question is more easily asked than answered. No battle has yet been won in that way, except skirmishes with Indians and uncivilized tribes, which hardly deserve the name of battles. There really are no data upon which an answer can be based. The answer which jumps so readily from the lips of the enthusiast is purely theoretical and wholly unreliable.

There is, perhaps, little danger that the veteran soldier, with the roar and smoke and turmoil of battle still seething in his memory, will ever concede a fictitious battle value to individual marksmanship. The paraphernalia of the rifle range are simply absurdities to him. He would never concede that the fighting qualities of a battalion are increased by the addition of a wind adjustment to the musket sights. Indeed the sight itself is of small value in line of battle work. Of course the sight and its adjuncts are valuable in certain kinds of work, just as the marks-

man is; but for purely line of battle work they are out of place. Veterans will readily admit this, but the veterans of our Army are rapidly stepping off the stage. In a few years they will be gone, and the younger soldiers that remain, trained as they have been to believe in all the heresies of the rifle-range, may be led to put a fictitious estimate upon the battle value of individual marksmanship. For their sakes then, let us in all seriousness inquire what that value really is.

In order that the question may be presented, reduced to its lowest terms, it is proper to state here, that outpost duty, skirmishing, foraging and all small detachment work, are not under consideration. The question proposed contemplates line of battle work alone. There is no question, that, on the skirmish line, or any of the duties just mentioned, the marksman has an immense advantage over the poor shot. For that reason, only marksmen should be sent on such duties. The German Schutz-enzug and the light companies of our old battalion organization, are the answers of experience on this point.

Still it is possible to exaggerate the skirmishing value of a line of marksmen. It will drive in the enemy's skirmishers more rapidly, and perhaps disable a greater percentage of them, than a skirmish line of line of battle soldiers, but the only practical effect of all that would be, to bring on the battle a few minutes earlier. And that is not always an advantage. If the ground is rough or wooded, a too rapid advance of the skirmish line might be dangerous. Still the skirmishers should be marksmen, even if they have to be restrained in their advance.

But it is the line of battle to which our question refers. Let us look at it going into action. Every veteran has many fine examples stowed away in his memory. They are all different, and yet they are all alike. Although each may have its own peculiarities, all have a multitude of features exactly alike. Let us reproduce the familiar picture.

There is the army, or that small portion of it which we can see, tired, haggard and dirty. The "gay and gallant tread" is not there to any great extent. The tinsel of the uniforms is tarnished, trousers are tattered, and many naked toes are peeping through the rents in contract shoes. The men have been poorly fed for days, and show it. Their digestions are impaired and their bowels rebellious. Last night they slept without their blankets—too tired, perhaps, to unroll them—and to-day they

have abandoned them as an incumbrance. Some of them think they will never need them more. They know there is a battle ahead, and if they live to hear tattoo they may be able to pick up a blanket. They are almost played out, and half glad that the agony is so nearly over. Better be killed they think than die of diarrhœa, and they brighten up a bit in view of the chances for the former alternative. Now these are not first-class conditions for making bulls'-eyes. Will any one pronounce them overdrawn?

They are in line at last. Skirmishers are thrown out, and the word is "Forward." This looks like business. The sun comes out, scorching hot, and converts their muddy uniforms into a kind of terra cotta covering. Onward they go, dragging their heavy feet through swamps and thickets, over dykes and ditches. Their canteens are empty—they have been marching since dawn—and their mouths are as dry as lime-kilns. Is it any wonder that they become impatient, irritable and cross. Then their rate of progress is disheartening. They make so many halts without apparent necessity, and always halt at places where there is no fence to lean against, and nothing to sit down on. Then they see no signs of an enemy, and bets are offered that there are none within a dozen miles. And so they grumble as they stumble onwards, at odds with everything and everybody.

But hark! A rattle of musketry in front, and the batteries open on both sides. Still no enemy is visible, not even the batteries that make such a racket. But a cloud seems to have been lifted from the line, and faces brighten up. There are none but brave men in the ranks. The cowards were absent at reveille, and the faint-hearted have fallen out from time to time, in obedience to convenient calls of nature. There is a strange sympathy between a man's spirit and his bowels. These calls are all genuine. There is no shamming: but many fail to return until after the fight.

The advance continues through woods and chapparal, and over occasional clearings. The music of battle seems nearer, but nothing is seen. Even their own skirmishers are invisible. They are lying in the outer edge of the brush, some two hundred yards ahead, and firing very industriously. Do they see the enemy? No; but they know he is there. They are firing at the little puffs of smoke which are being emitted from the brush on the opposite side of the clearing. The hostile skirmishers are there.

The hostile line is a little way beyond, concealed behind some ridge, or fold in the ground. It will remain concealed until it opens its fire in earnest. Meantime the hostile skirmish-fire increases in volume, and becomes continuous and galling. They have been reinforced and are trying to unmask the advancing line.

A halt is made in the timber. Canteens are filled at the muddy little brook near by, and the last cracker of the day's ration is eaten. The attacking skirmish line is re-enforced, and the firing sounds almost like a battle. Still nothing is seen of either line but the smoke, now so thick that individual puffs are hard to see. But the hostile batteries—or some of them—can now be seen through the trees, enveloped in a sulphurous cloud, in which the lightning seems to play, and weird-like shadows dance about like demons in their native element.

The weary line rests for an hour; and such a rest. The hostile batteries have found it out; at least they suspect its presence there, and shower the bit of timber with their shells, and the resting line gets restive and ill at ease. No situation is better calculated to try a soldier's nerve and test his character. If his individuality has been fostered in his training, he will fret and fume, and call his colonel names. There is not a marksman in the line but feels that he is being sacrificed. He objects to being shot down like a dog tied to a stake. If he were with the skirmishers, he thinks he could at least shoot back, and with effect, if the rifle-range gives any indication of skill; and the chances are that he will steal away to try. Thus many a brave soldier justifies to himself the crime of quitting the ranks. His individuality is stronger than his discipline, and his training is to blame for the result. If there be many such men in a battalion disintegration is inevitable before a blow can be struck.

The disciplined soldier feels and acts differently. Like his friend the marksman he has no love for the situation. He sees its dangers just as distinctly as the others do, and cannot comprehend why the battalion remains there, any better. But his training helps him to bear it. He has been taught neither to think nor to act without command. His individuality has been suppressed, and he has accepted the rôle of the small wheel in a complicated mechanism. His functions are not intellectual, and he is glad of it. He is willing that his captain should do the thinking for him on occasions like this, so he sticks to the ranks, uncomfortable, perhaps, but not miserable, and ready to obey.

Such a man is a disciplined soldier, and every company is valuable or worthless according to the number of such men it can count in its ranks. But we must get that battalion through the battle.

The afternoon is now well advanced. The hostile guns have sought some other target, and the wisdom of standing fast becomes apparent. The artillery battle has progressed, judging by the sound, and the hostile fire has slackened somewhat. And now a fearful cannonade begins. Every friendly gun has found a tongue, and shells from everywhere are bursting in front of the resting battalion. The woods catch fire, that is the leaves, and here and there the underbrush, and smoke accumulates and hides the landscape, front and rear. Night seems to have settled on the field.

And now the line moves forward through the smoke and the hostile skirmishers increase their fire to a maximum for a few moments, and then scamper off, a goodly number dropping by the way. The skirmishers of the advancing line rejoin their companies, when they reach the skirmishers' position, and as the line emerges from the timber, it encounters a hot artillery fire. Onward it goes, however, across the clearing regardless of shot and shell, and plunges madly into and through the second belt of brush. Losses are heavy now, for the hostile batteries recognize in the advance a main attack, but no reply is made. The advance is a scramble through the brush. Presently a second clearing is reached, and as the line emerges from the brush it meets a withering blast of musketry, which discloses for the first time the exact position of the hostile line. It lies along a ridge, perhaps three hundred yards away, concealed behind the crest which serves it as a breastwork. No men are visible, save here and there a horseman, distorted by the smoke, into gigantic size. But soon the thickening smoke hides everything, and the position of the enemy can be guessed at, only by the roar of musketry and the whirr of bullets. Fire is now opened by the advancing line. At every twenty paces or so, a volley is delivered, until assaulting distance is reached; or the line recoils unmanageable.

Such is the normal battle as seen by the soldier in the ranks. There seems to be very little fighting in it, yet to the point of assault or disaster it is all there, without exaggeration or curtailment. Eight hours of marching and scrambling; one of waiting and suffering, and fifteen minutes of line of battle work.

It is not claimed that the end of the battle is then reached. The fortune of the day is not bound up in that of any single battalion. But this particular battalion has reached the point at which the assault begins ; or it has been repulsed and is temporarily off the board. And where could individual marksmanship have been employed, except upon the skirmish line ?

The point that we desire to make is, not that individual marksmanship is altogether worthless, but that its usefulness is misunderstood and very much exaggerated. The argument, so generally advanced in its favor, that a soldier should know the powers and capabilities of his weapon, and be able to use them with effect, is a mixture of truth and falsehood which few take the trouble to analyze. As we have seen, the opportunities which active service offers for the individual use of the musket are very limited, and never decisive. It is by line of battle work, that battles are won, and individual training actually disqualifies a soldier for the proper performance of that kind of duty. Of course the soldier should be taught how to shoot, just as he is taught how to march. But such training is merely preliminary, and intended to fit him to take his place in the company. He should not be permitted to carry away the idea that it fits him for the battle-field. The company is the unit for that kind of work, therefore the company must be trained, and its training is very different from that of the individual marksman. Indeed the training of a soldier in individual marksmanship is positively injurious to efficiency in the company.

The pit of error into which so many have fallen on this subject was prepared by the introduction of the rifle as a military arm. Men were so carried away with its range and precision, that the nature of line of battle work was forgotten. Then most people have an idea that soldiers in battle aim at individual enemies. Indeed the command "Aim" is itself misleading, and it is unfortunate that it ever found its way into the musketeer's manual. The old word "Present," was less misleading. It conveyed no idea of alignment on a definite object, and merely required that the musket should be brought into a prescribed position. But the word "Aim" got into the drill-book, and there it remains, teaching the line soldier a fatal falsehood to this day.

But this paper has reached its limit, and we must reserve the discussion of "*musketry*" for another occasion.

STRATEGY, TACTICS AND POLICY.*

A SUMMARY.

By LIEUT. J. C. BUSH, U. S. A.,

FIFTH ARTILLERY.

AT a moment when continued progress in military technique seems about to cause a veritable revolution in tactics, General Iung of the French Service publishes a work in which all the questions of the hour are authoritatively treated and solutions given of the greater part of the problems presented.

The General considers the tactics of infantry as the essential one, that on which the particular tactics of the other arms should be regulated.

These tactics of infantry are about to undergo extensive modifications, due to the introduction of new inventions.

The first question which recent changes raise is, whether the tactical spirit is to remain offensive or whether the advantages given to the defenders of a position by smokeless powder and the rapid fire of repeating arms may not cause the superiority to pass definitely to the side of the defensive. This is simply a repetition of the question which appeared upon the first application of the breech-loading principle to fire-arms and which has come up again and again, under various circumstances, whenever the realization of a notable improvement has seemed to oppose insurmountable difficulties to the assailant.

But each time this doctrine, too quickly accepted, has been found false; and General Iung puts us on our guard against committing a new fault of this kind. He asserts emphatically that the offensive must be the rule, that it will assume greater and greater importance. But he is careful to add, that he refers to a rational offensive.

Indeed, says he, there will be found natural positions practi-

*"Stratégie Tactique et Politique," par Le Général Iung, de l'Armée Française. G. Charpentier et Cie., 11, Rue de Grenelle, Paris.

cally unattackable in front; these are rare, they occupy only a small portion of the field of battle, and to the chief belongs the duty of discerning them. For this reason, knowledge and appreciation of ground assume a special value.

This brings us back to what has always been true, namely, that we should not rush blindly upon any position that may come in the way. It is the duty of the chief to discover those positions which are really practicable for attack, and to make such dispositions as will secure all the chances of success.

Our author recommends, for the normal formation of the company in line, an arrangement in two single ranks or platoons six paces apart, the first platoon being placed under the orders of the lieutenant and officer of reserve who are stationed on the right and left of the rank respectively, while the second platoon is similarly commanded by the sub-lieutenant and adjutant. Each rank comprises two sections, and the non-commissioned officers are placed on the right and left of sections and sub-divisions.

This idea of manœuvring in single rank is not new, and the General supports his project by quotations from Lewal, Bugeaud and Jomini.

General Lewal has said: "Order is not an imaginary conception, it is a necessity."

"For infantry the superiority of fire over shock entails the suppression of compact formations."

"Fire is now so murderous that troops should not be needlessly exposed to it. On principle, there should never be found in the first line two men, one behind the other, in order that the same bullet may not occasion two wounds."

* "Deep order neither augments nor intensifies fire or shock. The effect produced by a column is not greater than that obtained by a line, is the opinion of Bugeaud and Jomini."

"Solidarity is obtained by a shoulder to shoulder formation, and this exists in single rank."

"A front is sufficient when it contains as many men in line as the ground admits of, provided they can use their weapons effectively."

"The ideal is the American single-rank shoulder to shoulder formation."

It will be observed by those who take the trouble to read "A Summer Night's Dream," that Colonel Hallen advances somewhat similar ideas with regard to single-rank lines.

The preparatory fighting formation consists of the optional separation of the ranks or sections, as circumstances may require.

The General proposes the following fighting order for the company:—The first section, composed of the best shots, moves to the front, constituting an advance line, formed in one rank, and placed in charge of the lieutenant. The rest of the company remain 300 metres in rear, formed in two ranks 100 metres apart. The captain, accompanied by a bugler, places himself between these two ranks so as to command both. Thus disposed, the company presents three successive lines, in which it suffers less loss by infantry fire while presenting a less target to shrapnel. It forces the enemy to repeated efforts. The advanced line can be reinforced by the first rank of the company, and again by the second, if the offensive be prescribed, or, in case of retreat, the advanced line is thrown back on the front rank and retakes its place without confusion, inasmuch as it knows that in rear the second rank remains intact as reserve.

"This fighting-formation should be taken up at 1500 metres, at least, from the objective, while between this distance and 4000 metres, the preparatory formation should be assumed; because, on this side of 4000 metres, that is to say, in the zone of artillery fire, it is impossible to manœuvre in column. It will be necessary, when in this zone, to manœuvre by parallel or perpendicular lines of a single file,—beyond 4000 metres, in column."

The General claims that his proposed formation corresponds to the requirements quoted, while offering certain advantages.

"It does not change the individual instruction of the soldier, his place in ranks, or the terms in common use.

"It increases each rank by seven shots. (Non-commissioned officers.)

"It permits doubling the extent of front without inconvenience.

"It suppresses useless movements, and is, above all, easy to handle."

The regiment is, of course, composed of three full battalions.

The principles governing this tactical employment are:—the greater and greater importance of preponderance in fire, the impossibility for infantry to fight in compact formation in the zone of effective infantry fire (*i.e.*, inside of 1200 metres), the impossibility of moving in column within 4000 metres of the enemy's

artillery, the necessity of separating the troops into single rank lines, the adoption of the method of successive lines and the greater importance of the offensive.

In conclusion, he says: "The tactics of infantry commence with instruction on broken ground.

"The man is chosen and instructed with a view to firing, to marching and appreciation of ground."

ARTILLERY.

Artillery according to its tactical value comes immediately after infantry. This place it owes to the increased efficiency of the weapon which it employs.

"Artillery," says Clausewitz, "is the highest expression of the destructive principle. On the other hand, it absolutely lacks independence; and when too numerous, diminishes power and renders the army sluggish."

Artillery is not self-supporting in war; alone, it cannot sustain a struggle against the other arms, however numerous or perfect it may be. In motion it is defenseless, useless, in the way. It cannot go everywhere as can the infantry. The rapidity of its movement depends on the condition of the roads.

Artillery cannot, like infantry, utilize all kinds of ground. Its flanks and front are both feeble. The instantaneousness of its fire is less than that of infantry, and at short distances its fire is less effective. With infantry a volley can follow immediately after the command—halt!—an average of two minutes must elapse before a battery can detach itself from the limbers and discharge its first projectile. A battery taking position in front of infantry, must therefore remain several minutes exposed to fire without being able to reply. It can thus be placed *hors de combat* before firing a single shot, if the distance be not too great, and the fire of the enemy be well directed.

The power of the arm resides in the range of its pieces, in the precision of its fire, in its moral effect, its destructive action against obstacles, in the ability to concentrate its fire on a given object at any desired moment, and in its perfect union with the arms to which it may be joined.

The general definition of its tactics is simple: "It comprises all dispositions which determine the judicious employment of the artilleryman, the piece and ground, as regards battle, mountain warfare, siege or sea-coast defense."

The means by which the artillery acts is the gun. This means is far from constant as in the infantry, but varies according to the object in view. When acting with infantry it is the field-piece and machine-gun; with cavalry the light field-gun; for mountain warfare the mountain gun; for the attack and defense of places, the siege gun; for coast defense, the sea-coast gun.

The nature of the piece, of the projectile, the fuses, the sights and the powder form so many different methods of employment, and consequently, so many different tactics and regulations.

The history of artillery is bound up with that of the engines placed in the hands of the artilleryman.

The value of the artilleryman is in direct relation to that of the piece. His selection, his instruction, his equipment, are subordinated to the kind of piece he is to use; they are direct functions of it.

True technical instruction is that of fire—the artilleryman should be identified with his piece. As to the tactical instruction, it commences only with the first application of field-fire.

The battery is the fighting unit, the group of batteries has become the tactical unit. The German artillery drill regulations of August 23, 1877, state: "The employment of artillery in groups of three or four batteries or in a regiment of six or nine batteries should be the rule, the use of isolated batteries, the exception." In fact, everything is changed; the artillery struggle in the next war will resemble nothing of which we have had any experience.

The moral effect of a projectile depends upon its mass, its remaining velocity, the noise of the explosion, the whistling of the fragments and the grave nature of the wounds produced. But what will be the moral effect of shrapnel? Will it be superior to that which results from percussive fire? How will this fire be regulated? Will the "sheaf" have the expected properties? These are all unsettled questions.

Should artillery fire over the heads of their own troops? According to the German drill regulations, Verdy du Vernois, and Von Scherff, this should be avoided as much as possible. Austria and Belgium admit the possibility of it.

According to certain officers, a battery completely supplied with ammunition and firing four shots per minute per piece can keep up the fire over three hours. Others reply, this is not possible without having recourse to the ammunition furnished by the fourth and fifth échelons. Now, these échelons, at the moment

when the advance-guard becomes engaged, are five or six leagues away at least. Can they come up in time? Will it not be necessary to advise them, and then go at a walk or trot to the desired place? Depending on itself alone, if the fire be sustained, the battery can, in an hour and a half or two hours at most, have exhausted the ammunition from the caissons, the limbers and the *train de combat*.

In his letters, Prince Hohenlohe has vividly pictured the anxiety attending a re-supply of this kind during the last war. Now, the same problem will be presented in the next war and under much more acute conditions.

But these tactics and dispositions refer to field artillery; those of horse-artillery are different and have relation to the arm with which it is usually united—the cavalry. Mountain, siege and sea-coast artillery have each their tactics, their special methods, their object, and above all, the special training of the man for each particular service. These tactics themselves vary again with the special forces engaged and the nature of the country wherein the struggle takes place.

CAVALRY.

Clausewitz places cavalry after artillery. "An army composed only of infantry and artillery suffices, indeed, but is placed in an embarrassing position as regards scouting, touch, and pursuit."

There is another reason, we believe, for this kind of subjection of cavalry to the other arms. This lies in the domain of evolution. The peculiar qualities of cavalry are shock and celerity; these are not found in the cavalryman but in his horse. The horse forms then the primary instrument of cavalry tactics.

In the infantry the effective medium is the rifle, in the artillery it is the gun; now in these two arms the weapon has obtained unexpected development and a greater and greater value. In the cavalry the horse remains the same animal as in the time of Alexander, of Bayard, of Turenne or of Kellerman. It is always the same inoffensive quadruped, trained more or less well, but subject to all the imperfections of the animal. The armor with which he was formerly enveloped has disappeared in consequence of improvements in projectile weapons, and that still preserved by some cavalymen is destined to a like fate.

The cavalry weapon is not separately capable of making war, it cannot sustain a struggle against the other arms.

At rest cavalry is defenseless, useless, in the way (as cavalry). It cannot go everywhere, but its celerity and mobility are superior to the other arms. Its flanks are feeble. The instantaneousness of its action is less than that of infantry and artillery.

Before reaching a body of infantry it can be easily destroyed if it has to do with an adversary well placed, calm and skillful, and it can be scattered by canister before reaching the front of a battery; while it preserves all its superiority by acting against the feeblest points of this battery—the flanks.

According to Article 116 of "Field-Service," reconnaissance and outpost duty constitute the two important missions confided to cavalry. Reconnaissance duty falls to the lot of the divisional cavalry, while outpost duty belongs to the brigades of the *corps d'armée*.

Now, as I will have occasion to show, the nature of the action appears to be modified by the new armament and above all by the new powder.

The power of cavalry will always be considerable, but its form will be changed. It will reside more and more in mobility and rapidity of movement, in the information gained and the means of touch between the columns, in the annihilation of the opposing cavalry by its shock, in the rapid destruction of communications and centres of supply, etc.; finally, in the moral effect exercised by its presence on the flanks and in the rear of an enemy's army, on convoys, on the population, etc.

The object of cavalry is always immediate.

Its tactics have a dual purpose and comprise all dispositions that determine the judicious employment of the trooper, of his horse, and of the ground, both as regards the battle and the collection of information.

The selection of the trooper, his equipment and instruction are subordinated to the kind of horse he is to use, as regards shock or information. They are direct functions of it.

The more rapid the movements, the more considerable the fire-effects of infantry and artillery, the more important it becomes to judge the ground accurately. This is particularly the case with cavalry. An order once given, there is no time to repair a fault, to send after those who are to execute it and cause them to take another direction. Great decision of character is

necessary on the part of the chiefs and above all, discernment.

Cavalry has two objects, shock and celerity, battle and information. These correspond to two kinds of cavalry, that of the line and light cavalry. In the first, the man should be tall and slender; in the second, small, agile and endowed with excellent vision.

Exercise with the horse and rifle form the basis of the technical instruction; this once finished, that of tactics commences with their application in the field.

But the tactical methods employed at present seem to afford cause for observations of more than one kind.

According to a former minister of war, General Berthaut: "Great masses have had their day. Under the First Empire, which is continually invoked without remembering that the infantry had flint-lock muskets, hardly dangerous beyond a hundred metres, masses did not produce results proportionate to their numbers nor the sacrifices and embarrassment which they occasioned. It may be very interesting to command them, to manœuvre them in one's thoughts but quite another thing to bring them together on the field, to make them live and move in actual campaign."

"At Sadowa," said Ristow, "there were no engagements of cavalry in masses, but the Prussian divisional cavalry performed wonders of bravery."

"The 16th of August, at Gravelotte, adds Prince Hohenlohe, they employed masses, but not in masses, in driblets."

Colonel Decker claims that a favorable occasion for action presents itself but rarely to cavalry in masses, while nine chances out of ten are offered, in the space of an hour, to divisional cavalry.

In the opinion of General Lewal, cavalymen again extol the keeping up of great masses, of compact formations. All other military writers, foreign as well as French, are unanimously of a contrary opinion. Empiricism is fatal in matters of war. The reproduction of the same facts, the same methods, ends in impotency; as the planting of the same seed, in the same ground leads inevitably to the degeneracy of the plant. The employment of cavalry requires, henceforth, more science and skill than vigor, more ability than numbers."

Prince Hohenlohe in his Letters, expresses the same opinion.

"I cannot agree with several defenders of the cavalry when they propose to separate the cavalry from the infantry, to give it an independent organization, to form permanent divisions of self-directing cavalry, and unite a number of these divisions under inspectors of cavalry all dependent upon one inspector general."

The defenders of the old tactics have arguments equally satisfactory to themselves.

According to the eminent editor of the "Project d'Instruction sur l'Employ de la Cavalerie:" "A war of masses imposes a tactics of masses. The organization and instruction of cavalry should have this precept as a basis. The arm of shock is the lance."

The lecturer at the war school is of the same opinion: "It is important to throw the bridle on the neck of the cavalry, freeing it from all fetters which bind it to the other arms, if we desire it to render the services demanded by its rôle.

In France for a long time now, the principle of separating cavalry from the other arms, has been admitted, though it was principally brought about by considerations touching facilities for marching.

The author of "Cavalry in Modern War," simply developed this same idea. He states: "The cavalry ought not to await orders, it will receive them too late. Besides it cannot remain at the disposition of the army commander or of the *corps d'armée*. Scattered in rear or in the intervals of the lines of battle, it will be virtually paralyzed, condemned to succumb without glory, or to render itself illustrious without really influencing the result. Massed on the flanks it is removed even from the influence of the general-in-chief. He cannot embrace in his glance the whole extent of the field of battle nor go over it. Placed in rear, in a central position, he is united to the principal actors by numerous telegraph lines. He is the terminal point on which converges all the throbbings of the arteries, and from whence go forth all pulsations. Thus, invisible player, he directs the many pieces of this huge checker-board. Once disposed, these pieces are moved from place to place by a slow, progressive and regular march. He graduates their efforts, pushing forward some, restraining others.

"Cavalry cannot submit to the common rule. Drawing its principal strength from its mobility, its celerity, it knows not how to cling to a fixed point, to wait or ask for orders. From the

general-in-chief it receives general instructions, it then recovers its independence."

In short we find ourselves in presence of two conflicting opinions.

"According to one, the employment of great masses has had its day, the subordination of cavalry to infantry ought to be complete; according to the other a war of masses imposes a tactics of masses,—the independence of cavalry ought to be complete.

"But since the utterance of these two views, so different, considerable modifications have been made in the fire of infantry and artillery. Smokeless powder has been adopted. Now will these modifications change the conditions of the problem and of the discussion? I think not. The defenders of the two systems are both right, and if there are apparent contradictions, this is owing, in my opinion, to a simple error of interpretation and of the real bearing of the question."

Evidently with the extension of the lines and the depth of the field of battle, by reason of the extreme range of the weapons, a general-in-chief cannot give orders to the chief of cavalry in regard to an immediate action. Cavalry is not subject to the same conditions as infantry; the effect of its operations is neither so instantaneous nor so continuous. Before an order could reach it in transmission, a considerable interval must elapse, and the fight once begun, the propitious moment would have passed. Now with cavalry, all success belongs to the moment and to the ground. In this regard the cavalry chiefs appear to be right in claiming independence of action.

But in the present state of infantry armament, cavalry cannot make a front attack on infantry; to take a battery in flank, to spike the guns, blow up the gun-carriages, and carry off the teams is the most it can do.

A *corps d'armée* or division of infantry can count on being well informed only through its own cavalry. The every-day intercourse between the two arms should be sufficiently intimate to enable each infantryman to recognize the cavalry that have to pass continually through his lines. It is the only way to avoid mistakes and panics.

In a word, officers' reconnaissances, discovery and exploration work are destined to change their object and method.

On the other hand, a commander-in-chief cannot admit the possibility of independent action within his lines to so power-

ful and fleet an arm. It is not supposable. On the battle-field the object is immediate, the direction one, decision instant; there can be no place for two aims, directions, decisions, and responsibilities. It is this obligation which General Decaen explained so well to his corps commanders before the battle of Solferino.

In short, we find ourselves in presence of two opposite interests, resulting from two different conditions. To satisfy them both it would appear sufficient to divide this arm, as artillery is divided into field and fortress branches, so as to form a kind of cavalry of infantry and independent cavalry. The first should be placed, during peace, under the orders of the generals of division and corps commanders as regards tactical instruction in connective and outpost duty for the division and corps. The second, independent, absolutely independent, should remain under the direction of its immediate chief and receive from the commander-in-chief only general instructions.

Placed on the wings, or grouped according to the ground, it will have for its mission the destruction of the opposing cavalry, protection of the flanks, destruction of the enemies' material and communications, and collecting information. Disembarrassed of the adverse cavalry the other would have a free field, and could then do great damage by its rapid action in the midst of the long lines, stretched to the rear, which the supply of modern masses renders necessary.

The army, or fighting force, advancing slowly with its engines, forms a block difficult of attack in front, and feeble only on its flanks and in its train,—long and diffuse like that of a comet. It is against these points that cavalry can enact its rôle with immense éclat in the hands of a skilful chief knowing the ground and how to utilize it.

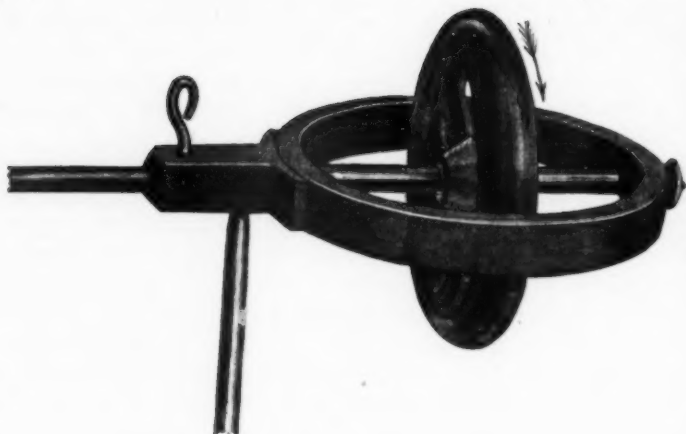
The influence of a division of cavalry possesses a radiation of eight kilometres, corresponding to the range of its pieces,—4000 metres. It is therefore a moving circle of eight kilometres diameter, having at the centre a nucleus, formed by the cavalry of the line and its artillery, and having its light cavalry on the circumference in dispersed order. This mass, endowed with great rapidity, can do all the work of screening and reconnoitring.

The cavalry brigade, comprising three regiments,—one of the line and two of light cavalry,—with its batteries, will satisfy the new necessities in the existence of this special unity.

The simplification of manœuvres, movements by lines and by rank as in infantry, fighting on foot, complete fire instruction, and exercises on broken ground, are the consequences of these modifications; and finally two tactics, one for the cavalry attached to the divisions of infantry, the other for the independent cavalry.

War is not waged with one arm alone, but with a combination of all of them. Each must be applied when best suited to the contest in hand, and to the end to be attained. The cavalry has a dual duty and it is necessary, therefore, to divide the preparatory instruction into two courses.

We must adapt the means to the end.



THE GYROSCOPE AND "DRIFT."

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IN the following paper is given an explanation of the *cause* of the sustaining force and other phenomena of the gyroscope, without any attempt at a mathematical analysis of the problem.

THE GYROSCOPE.

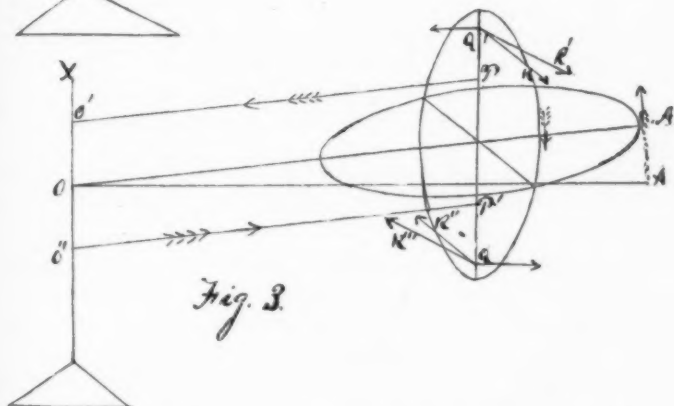
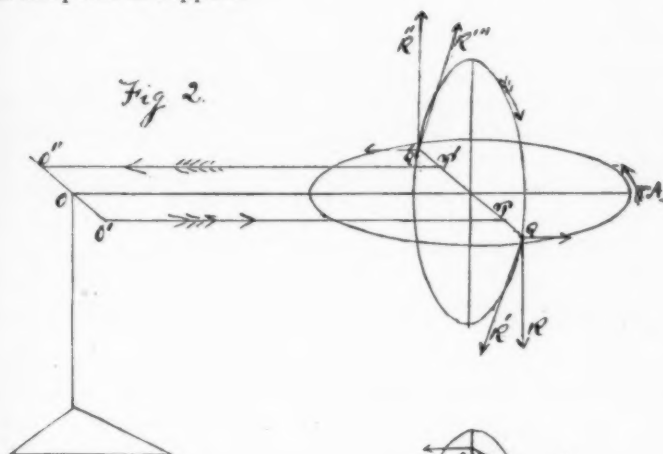
It is known that a gyroscope placed horizontally, with its wheel in motion, and supported only at one end, will not fall, but will sustain itself in the horizontal position and take up a horizontal motion of revolution about its point of support.

The cause of these phenomena, it is believed, has never been satisfactorily explained, and an explanation will be attempted here, referring the whole problem to centrifugal force.

In what follows, the motion of the wheel of the gyroscope and that of the gyroscope itself, must be carefully distinguished.

The sectors of the wheel made by the vertical plane through its axis, will be referred to as the front and rear semicircles. Those made by a horizontal plane through the same axis, as the upper and lower semicircles.

The above figure represents a gyroscope in position, the wheel in motion; right-handed, or with the hands of a watch, the eye at the point of support.



The motion of any point Q (Fig. 2) in the front semicircle, may be resolved into two components; one horizontal (omitted in Fig. 2), the other vertical ($Q R$), downward.

When, under the force of gravity, the gyroscope is constrained to drop or revolve downward about its point of support O , the vertical component $Q R$ is constrained from a vertical downward direction, to an inclined downward direction $Q R'$ to the left. Centrifugal force will thus be developed in this point in the opposite direction; that is, horizontally and to the right. (See ar-

row at Q Fig. 2.) Since every point in the front semicircle will be affected in the same manner (though in different degrees), there will be a resultant thrust to the right in this semicircle.

The "Mass" of the wheel and the varying vertical component velocities being symmetrically disposed about the horizontal plane through the axis of the wheel, the resultant thrust will be in this plane at some point P, and will be parallel to the axis of the wheel and also to that of the gyroscope. Thus a "Couple" will be formed at O, with OO' as its lever arm.

This "couple" will constrain the gyroscope to revolve horizontally about the point of support O, backward, through the paper, or from the observer. (See arrow at A.) The motion of any point Q' , in the rear semicircle may, likewise, be resolved into its horizontal and vertical components; the latter upward ($Q'R''$).

Under the fall of the gyroscope, by gravity, this upward component will be constrained into an inclined direction, upward and to the right ($Q'R'''$). This, by centrifugal force, will develop a thrust to the left. (See arrow at Q' .) From this we pass, by the same reasoning as in the first case, to a "couple" at O, with a lever arm OO'' ; thus causing the gyroscope to revolve horizontally backward, through the paper as in the first case.

These two "couples" conspire, and are sufficient to account for the observed horizontal motion taken up by the gyroscope in experiments.

The horizontal component motions of points in the wheel not being disturbed in their parallelism by the drop of the gyroscope, no centrifugal force is developed in them.

These actions being continuous, the horizontal motion of the gyroscope will be continuous so long as the wheel continues to rotate.

The line described by the outer end A of the gyroscope will not be a horizontal circle, but an epicycloid, to be explained further on.

Had the rotation of the wheel been left-handed, the horizontal motion of the gyroscope would have been to the front.

Had the disturbing force been upward (as in the case of the service oblong projectile), instead of by gravity, downward, the horizontal motion would have been to the front.

The gyroscope, in passing horizontally from its original posi-

tion $O A$ (Fig. 2) to its new position $O A'$ (Fig. 3), revolves about the vertical axis $O X$.

Still assuming right-handed rotation of the wheel, the gyroscope, in passing from $O A$ to $O A'$, will disturb the parallelism of the horizontal component motions.

We will consider first a point Q , in the upper semicircle (Fig. 3). By the motion of the wheel the horizontal component $Q R$ has a direction to the front of the paper. By the receding, or backward motion of the whole gyroscope, this component is constrained to a horizontal direction $Q R'$ inclined to the paper, and to the right of the observer.

Thus a thrust is developed to the left by centrifugal force. (See arrow at Q .) Every point in the upper semicircle being thus affected, there will be a resultant thrust at some point R , to the left.

This resultant will lie in the vertical plane containing the axis of the wheel (and gyroscope) and will be parallel to that axis, as explained in the two preceding cases.

Thus a "Couple" is formed at O , with $O O'$ as its lever arm, and the gyroscope is constrained to revolve upward and to the left about its point of support O . (See arrow at A' .)

By entirely similar reasoning on the motion of a point Q' , in the lower semicircle, it will be seen that a "couple" will be formed at O , with $O O''$ as its lever arm, the force acting to the right, and thus tending to revolve the gyroscope upward about the point O .

Thus the two resultant thrusts conspire to lift or hold up, the unsupported end of the gyroscope; which fact explains the self-supporting phenomenon of that toy.

If it be asked why it does not continue to rise and finally take a vertical position, the answer is as follows:

As it tends to pass above its original position, the conditions are all reversed with, of course, reversed effects.

By a course of reasoning similar to the above, it will be seen that a left-handed rotation of the wheel will also develop the sustaining force of the gyroscope, although the horizontal motion will be reversed, that is, to the front.

A force acting on the unsupported end of the gyroscope, but in a direction opposite to that of, and greater than, gravity, will reverse all the phenomena. The outer end of the gyroscope (under gravity) will first fall, then move horizontally, then rise,

possibly recede slightly and then fall again, etc.; thus the epicycloid will be described, with small loops, or possibly cusps. If the rotation of the wheel remain constant, the epicycloid will be in a horizontal position and the horizontal motion will be uniform. If the rotation of the wheel decrease, the outer end will descend, the epicycloid will descend in a spiral, and the horizontal motion decrease. If the rotation of the wheel increase, the motion of the outer end will approach more nearly a circle (or right line when developed) and the horizontal motion will increase. When the rotation of the wheel is infinite, the epicycloid is a perfect circle, the force of gravity being zero in comparison with the centrifugal force developed, and the horizontal motion is infinite.

These phenomena would be developed more perfectly in vacuo than in a medium; a medium in no way tending to produce them, though greatly modifying them.

In the absence of the force of gravity the gyroscope would remain horizontal, but take up no motion.

Thus the phenomena of the gyroscope are referred to centrifugal force, or inertia of motion.

"DRIFT."

Drift is the result of the combined effects of the force of gravity, air resistance, and gyratory motion.

The air plays a twofold part in drift:

First: By its resistance to the motion of the projectile in the trajectory, it produces rotation about a principal axis of the projectile, which axis is perpendicular to the longest principal axis. This, when the resultant resistance of the air does not pass through the centre of gravity of the projectile; or, in other words, when a "couple" is formed.

This rotation, with the rotation of the projectile about its longest principal axis given by the rifling, produces gyratory motion. Thus the axis of the projectile is deflected from its original position.

Second: The air now acting upon the side of the projectile deflects it from its original line of direction.

Drift may be up, down, right, or left, or obliquely between these directions, depending upon the position of the plane of the "couple;" being always at right angles to this plane.

There would be no drift in vacuo, nor in the absence of the

force of gravity. In the first case the trajectory would lie wholly in the vertical plane containing the axis of the piece, and the axis of the projectile would retain its parallelism to its first position. In the second case the projectile would describe a straight line until brought to rest by the air resistance acting only directly opposite to the direction of motion, there being no lateral deflecting component of air resistance. In the case of a rifle projectile the force of gravity causes the projectile to fall from the axis of the bore prolonged. This causes the resultant air resistance to act upon the under side of the projectile.

The air resultant will, in this case, lie in the vertical plane containing the centre of gravity and the tangent to the trajectory, thus producing a vertical "couple."

This "couple" causes rotation about a horizontal axis perpendicular to the vertical plane of the trajectory. This rotation, with that of the initial rotation of the projectile causes gyratory motion, or deflection of the axis from the plane of fire; the gyratory motion exposes the side of the projectile to the resistance of the air; and this resistance produces drift.

The above unqualified statements, it is hoped, will be established and made clear in what follows.

It is admitted that the force of gravity deflects the projectile downward from the axis of the bore prolonged.

It is also admitted that, if the axis of the projectile retain its parallelism to its original position, the resultant air resistance being tangent to the trajectory, will be applied to the under side of the projectile.

It is also admitted that if the air resultant do not pass through the centre of gravity of the projectile, a "couple" will be formed and hence rotation. It is this rotation of the projectile, in connection with its original rotation, that we will now consider.

The service oblong projectile has an infinite number of sets of three rectangular coordinate principal axes. The axis of the projectile is always one of these; the other two, in any set of three, are in the plane passing through the centre of gravity of the projectile and perpendicular to the first. As there is an infinite number of these sets of two, there is also an infinite number of sets of three.

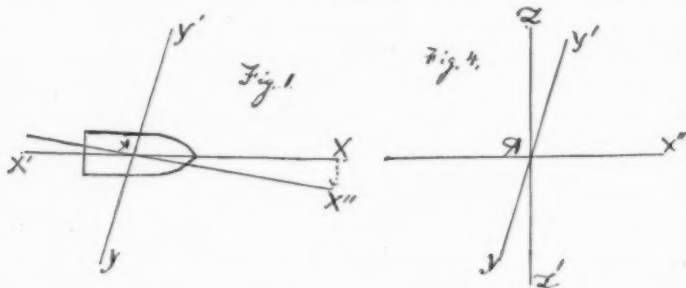
We shall be concerned only with the set whose axes are:

First, the axis of the projectile; second, the one perpendicu-

lar to the first and horizontal; and third, the one at right angles to the plane of the first and second; all these passing through the centre of gravity of the projectile of course.

That motion which is in the direction of the hands of a clock, when viewed from the "origin," looking towards X, Y, or Z, will be called right-handed; the opposite, left-handed. Of course when viewed from the same point, but looking in the direction of $X'Y'$, or Z' , this motion will be reversed. This should be clearly understood and constantly remembered or confusion will follow.

This, of course, is arbitrary, but it is believed to be the usual way of denoting direction of rotation, and if not deviated from during the discussion of any one subject, will be clear throughout.



Let AX (Fig. 1) be the axis of the projectile and AY a second axis, horizontal, perpendicular to AX , and passing through the centre of gravity. Suppose rotation be impressed about both these axes simultaneously. In this case rotation will take place about neither AX , nor AY , but about some new axis lying in the same plane and passing through A . (See Bartlett's *Mechanics* and Silliman's *Physics*.)

To determine the angle in which this new axis will lie, will require consideration of the relative directions of the two impressed rotations. There will be four cases: both right-handed; both left-handed; and the two cases where the rotations will be in opposite directions.

Now the new axis will lie in that angle in which a particle is impressed in opposite directions by the two rotations. (See Silliman's *Physics*.)

For example, let there be right-handed motion about both AX and AY . A particle situated in the angle YAX will move

downward by the motion about AX and upward by that about AY: whereas a particle situated in the angle Y'AX will move upward in both cases; hence the new axis will lie in the angle YAX. Now as to drift; the service oblong projectile has right-handed rotation. If the line of resistance of the air pass above the centre of gravity, there will be right-handed rotation about AY also. Hence the position of the axis AX of the projectile will pass to some new position AX", in the angle YAX.

This will expose the left side of the projectile to the resistance of the air, and hence there will be drift to the right.

By combining right and left-handed rifling with the two possible positions of the centre of gravity, one above and the other below the line of resistance of the air, there will result four positions for the new axis, as follows:

TABLE I.

Centre of gravity below, Right-handed rifling.	{ }	New axis in angle YAX, Drift to right.	
Centre of gravity below, Left-handed rifling.	{ }	New axis in angle Y'AX, Drift to left.	
Centre of gravity above, Right-handed rifling.	{ }	New axis in angle Y'AX, Drift to left.	{ ..(1)
Centre of gravity above, Left-handed rifling.	{ }	New axis in angle YAX, Drift to right.	{ ..(2)

The axis of the projectile, in passing from the position AX, to some new position AX", (Fig. 1) produces rotation about a third axis AZ perpendicular to the plane of YAX. (Fig. 4)

By now considering, in a manner entirely similar to the above, the rotations about AX" and AZ, we arrive at results identical with the above in regard to the upward and downward motions of the point of the projectile, and hence the upward and downward drift.

TABLE II.

Left-handed motion about AZ, Right-handed rifling.	{ }	New axis in angle Z'AX", Drift downward.	
Left-handed motion about AZ, Left-handed rifling.	{ }	New axis in angle ZAX", Drift upward.	{ ..(2)
Right-handed motion about AZ, Right-handed rifling.	{ }	New axis in angle ZAX", Drift upward.	{ ..(1)
Right-handed motion about AZ, Left-handed rifling.	{ }	New axis in angle Z'AX", Drift downward.	

In speaking of drift upward or downward we do not mean identically the same thing as when speaking of lateral drift. In the latter case there is actual deflection, while in the former there is a greater and less retardation of the fall of the projectile due to gravity.

By inspecting (1) and (1), Tables II and I, respectively, we see that when the centre of gravity is above the line of resistance of the air, and the rifling right-handed, there will be an upward drift, or lifting, or holding up of the projectile.

Also when the centre of gravity is above with left-handed rifling, there will be the same result. See (2) and (2), Tables II and I.)

From this we conclude that if a projectile could be devised with the centre of gravity above the line of resistance of the air during its entire flight, the range would be increased for either right or left-handed rifling. In a projectile where the line of resistance of the air passes through the centre of gravity there will be no drift.

Now for a moment, disregard drift and consider only gyratory motion. Since, in the service oblong projectile the resultant air resistance passes above the centre of gravity, the first impulse is to raise the point. As shown in the first paper, the point will not rise, but will pass to the right.

The second impulse, due to the "couple" formed by the air acting upon the forward end of the left side of the projectile, is to move the point to the right. But again, as shown in the first paper, the point will not move to the right, but downward, the motion being always perpendicular to the plane of the "couple."

The third impulse being downward, the point will move to the left; the fourth being to the left, the point will move upward; the fifth being upward again, the point will move to the right, and so on.

Thus the points will describe a drawn-out spiral about the line described by the centre of gravity. It is this motion of the point of the projectile that explains the fact that the axis of the projectile does not remain parallel to its first position, but is approximately parallel to the tangent to the trajectory. Could the trajectory be indefinitely prolonged, not only would the axis of the projectile revolve entirely around the trajectory to a position parallel to its first position, but, under the effects of drift, the

observed trajectory itself would be a greatly drawn-out spiral about a true or theoretical trajectory.

Inexact centring, want of homogeneity in the metal and also of symmetry in its disposition about the axis of figure of the projectile, with other causes, undoubtedly affect the position of this axis and also greatly modify the spiral motion of the point in its flight.

THE PRACTICAL EDUCATION OF THE SOLDIER.

BY FIRST LIEUT. C. D. PARKHURST, U. S. A.,

FOURTH ARTILLERY.

(Continued from JOURNAL, No 47.)

SO far I have dealt with nothing but foot troops, and all that has been said of them applies with equal force to the dismounted duty of our mounted troops. The recruit must be "set up" as well for cavalry and light artillery as for infantry. He must learn the manual, the variations therein being only those made necessary by his special arm. But it is at once seen that he has more to learn, and that a horse as well as himself has to be set up and brought to a state of perfect training. If our cavalry is to be simply mounted infantry, then perhaps our present system is all sufficient, as in this case man is the principal factor, and the horse secondary. But if our cavalry is to be effective as cavalry,—if it is to be depended upon to fight on horseback,—then our system fails, and something more than our present manner of training and of drill becomes necessary.

At the beginning of this article I spoke of the knights and Indians and the manner of their training from their youth up. The true cavalryman needs to be as fearless a rider, and as much at home on horseback as either of these ever were. A perfect rider on an untrained horse is as helpless as a poor rider on a horse that is perfect. Horse and man must be in accord to produce the best results, and this end is not attained by our present system. As with our foot troops, we begin on a wrong basis,—never lay a proper foundation,—and consequently have a like faulty superstructure.

The cavalry recruit should be especially selected for his love for and lack of fear of a horse. As soon as it is discovered that the prospective cavalryman is afraid of this animal he should be at once discharged or transferred to another arm. Then with proper material to work with there may be some hope of success.

The horse, too, needs the utmost care in selection. But with

the best of men and horses our present system very rarely produces the best results. We put a new and green recruit on a horse and try to teach him to ride before the man has learned to control himself or to use his muscles. If the foot soldier needs gymnastic training first, how much more does the cavalryman. He must bring muscles into play that never have been in use before in a similar manner. He must learn to be quick and agile, and must be perfectly able to control himself before he can hope to control his horse. All this can be greatly aided by a proper training in the gymnasium, which must take the place of the early boyhood training of the knight or Indian. But even then the faults are not all done away with. We put the man on a horse, the bridle in his hand, teach him an improper seat, and then leave him to find the rest out for himself. If we did not give him the bridle to hang on with, for that is invariably the first use he makes of it, what would be the result?

Let the horse be led by a well trained trooper, and the recruit taught to sit and balance and ride with his arms folded, would not he learn a seat and a carriage he never learns now? When he at last gets the bridle, would he not be better prepared to learn its proper use? And last, but by no means least, would not the horse have been left with an uninjured mouth, one that had not been ruined by the constant pulling on the bit?

To use his weapons the cavalryman must have a natural, easy, and flexible seat. He must be able to lean to either side, to turn, to twist, to lie forward or backward, and this he cannot do with the present "tongs across a wall" seat, with his saddle upon his horse's withers. He should ride, not in or on his stirrups, but by the pressure of the thighs and knees. No one but a giant in strength can clasp a horse so as to hold himself in the saddle without his stirrups by the use of the forked seat.

Those who live in the saddle never use this seat except for special purposes. The Arab, the Indian, the Cossack, all ride with a seat that is easy and flexible. Reading and observation combine to bear out my statement that our seat is not the proper one, and is not the seat to give the best results or to make the best cavalryman.

Under the present system the men never see their horses except at stables or at drill, nor are they encouraged to mount and ride, free from the restraints of the rigid rule of the riding school.

How many of our horses have ever been properly bitted and

trained? The new, green horse is generally taken and bitted hap-hazard, saddled-up, and any one,—perhaps the poorest rider in the troop,—put upon him to teach him. The result must be obvious, and it is no wonder that our horses will not trot together at any but the slowest gait. It is no wonder that they chafe and fret, break into a "bastard lope," "jiggle," and do all the many things which they ought not to do, and so few of those that are essential for proper cavalry service.

Nor can the cavalryman claim want of information and text-book authority to tell him how the training should be conducted. The cavalry drill-book contains ideas gathered from many authorities. It might be better if standard text books were furnished, and their contents required to be learned and discussed by the officers and instructors. But these instructions as to training, biting and the care and management of the horse might as well never have been written. In all my years of cavalry service I was never taught anything in regard to the horse.

At last we have our recruit and his horse with whatever training has been given him, and can begin to consider his teaching at drill in the school of the platoon, the company and battalion.

It is not my province to discuss the faults to be found in the present drill-book, nor to point out the many impossible movements there required. I desire, however, to show that our system is wrong in its ideas as to what a cavalryman should be, and that, no matter what improvements may be made in the tactical movements, we can never have effective cavalry until other ideas of instruction become the rule. Parades, ceremonies and show have all their legitimate and proper place. But are the cavalry and other arms of the service to be drilled for accuracy alone, to enable them to pass a creditable inspection? With our cavalry, more than with our infantry, much valuable time is lost in trying to obtain an almost impossible exactness. We cannot hope to obtain the accurate dress of infantry, nor do I believe it should be attempted. On the contrary, the troop should be taught to be a free and bold riding body of men, afraid of nothing. At home on rough or smooth ground, they should be able to execute their movements at a free and swinging gallop. The horses should be trained to stand fire and to be perfectly fearless in the noise, confusion and smoke of battle.

Once I fell heir to the command of a troop that could drill beautifully at a walk and slow trot. They needed no further in-

struction as to the method or accuracy of executing all movements at these gaits, but when I put them at a gallop, feathers in a hurricane but ill expresses the manner in which they broke up. It took me three months of hard work on the riding school to teach the men how to ride without devoting all their minds and strength to the simple task of holding on. When I took the troop on rough and untried ground the result was confusion worse confounded, and when I tried mounted skirmish firing, the horses bolted, showing that no matter how valuable the troop may have been as mounted infantry,—no matter how well it may have appeared upon parades, inspection, and review,—it was simply worthless as cavalry.

The sabre exercise as a means of securing an easy and flexible seat can never do the trooper harm. But, mounted, it should be taught at something else than a walk or a slow trot. Precision and accuracy of movement should be given on foot, and, when mounted, the exercise should be practised at rapid gaits as in actual service.

With the pistol much has been done but much more remains to be accomplished. It is well known how bitterly its use on horseback is opposed by many of our mounted officers, and, as a consequence, how the practice that is required "by order" is done in a routine, half-hearted, manner, the men being taught to fear its use rather than to use it safely and effectively. To do this requires as great an effort to learn how to do it, as now appears on the part of many how not to do it. We cannot take the horse and rider, wholly untrained, and expect anything else than failure. But by the use of blank ammunition as a preliminary, and finally full service charges, we can train the horse to be perfectly steady under fire, and the men to make the target and its adjacent ground a very uncomfortable place for the enemy.

We all know how hard it is to force the untrained horse upon any obstacle. Suppose we put up an open line of skirmish targets on the drill ground, and teach the men to ride their horses through the intervals, first at a walk, then at a trot, and then at a gallop. Can we not by such means teach the horses that, when they start to charge they are expected to go through that line, and not to break and disperse before reaching it? Then, when the horses know this much, the pistol can be brought into play and the men taught to fire and the horses to stand fire until at

last we have a mounted force that would be effective against an opposing line.

Horses suffer as well as men from a long continued drill or march at one gait. This tires out muscles that are used only in one way. Leg weary horses on our marches are made so, in great measure, I think, by the walk, walk, hour after hour, day after day, with never a chance to change the gait and rest muscles used in walking by bringing others into play.

I believe our horses are not worked enough; they are too fat for long continued or hard service,—the general idea being that a fat horse is a strong one. We all know that the racer is kept in constant training. He is hard and strong in muscle all over. The athlete is the same and no more thinks of going into a race or fight without training, than he would think of suicide. So it should be with our horses. They should be ready for instant as well as constant service. Their health requires at least two hours daily exercise, but their good condition calls for more than this. Unless they be exercised at rapid gaits, they should be worked enough to keep down fat and make them tough, hard, wiry and strong. But we must have fat horses in order to pass inspection. We do not want to be told that our horses are thin and look poorly, and so we go on with animals that are never in condition for hard work either in garrison or field.

Dismounted, at known distances as well as at skirmish firing, the greatest excellence has been attained in the use of the carbine. A great advance has been made in putting the trooper in a class by himself, so that, in all competitions, he is no longer handicapped by the superior qualities of the infantry rifle, and is no longer allowed or required to use it to the prejudice of his own arm. But admirable and desirable as all this may be,—imperative as it is that this should be taught him, is it not also needed that he be taught the use of the carbine mounted? Experiments in this use of the carbine have shown that it has great possibilities, and I believe it should be fostered and developed to its utmost.

It may sound utopian to talk of a cavalry charge with the carbine first and then with sabres or pistols. Many expert cavalrymen declare that it cannot be done and cite their experience to prove that the sabre and the sabre alone is what wins the day. But past experience has been mostly with poor weapons, poorly drilled men, and without the enthusiasm and spirit of a firm be-

lief in the effectiveness of the carbine or pistol as a weapon. In every case of which I have read, the charge of the men with pistols or carbine was weak and not sent home. In many cases the line stood at a halt and received the charge with a volley, while in the sabre charge the men were sent in with a vim, and of course swept away the opposing line, as much by force of impact and enthusiasm as by the sabre.

We hear and read of large bodies of infantry being made to charge on infantry. It is expected that this will be done in future wars, in spite of rapid fire and machine guns and the widely extended and deadly zone of fire. Now if this can be done in successive rushes by an infantry line why cannot it be done with cavalry? True enough the cavalryman presents a much larger target and is more easily hit by the infantry fire than infantrymen, but he takes less time to cross this zone of fire. His greater size is compensated for by the rapidity of his movement. Instead of riding forth silently, sabre in hand, only able to strike when within arm's length, if he begin to fire upon his enemy at long range with the carbine, following this up at short range with pistol and then using the sabre, the infantry line is not going to be quite as cool, collected and effective in its fire as we are led to believe. An added terror will be given to the already terrible nature of a cavalry fight, and the dashing, expert, enthusiastic cavalry leader may yet snatch laurels of victory for himself and his cause.

The remarks that have been made as to the field effectiveness of infantry apply with equal force to the cavalry, and therefore need not be recapitulated. The cavalryman has more to learn, however, in some ways and some of the points will be dwelt upon.

The infantryman carries his own load and can therefore soon tell by his own sensations when his pack is faultily adjusted. A little experience soon teaches him how to pack and to carry his load with the maximum ease and minimum fatigue. But the cavalryman's load, including his own weight and all of his equipments, is carried by the horse upon the saddle, and the horse cannot complain when the load causes him undue pain and fatigue. The greatest care in instruction, and the most unremitting attention as to how the horse is saddled, and the load packed are imperatively essential.

The transportation that accompanies cavalry is of the greatest

moment, and to this point the cavalryman can well give his serious attention. The pack-mule is *par excellence* the cavalryman's aid in the transportation of his extra baggage, and, though it may be expensive, the results that may be obtained by its use are worth all it costs. Those of us who have campaigned with thoroughly experienced packers of the West, and have known the ease and comfort resulting from the constant presence of the pack-train,—have witnessed the endurance of the pack-mule and the thousand and one things that recommend it,—know that pack service can be made effective. By its means we can travel faster, farther and more unencumbered than with wagons, and in every way be more effective and more of a terror to our enemy's outposts and rear. Scientific packing with the aparejo needs specially trained packers, but Mr. Moore, one of the best men and best packers I ever saw, who was at one time chief packer for the Division of the Missouri, has devised and perfected an adaptation of the aparejo for cavalry use. His apparatus is simple and yet effective, and by its use the special talent needed for the aparejo can be in part dispensed with. But once and only once have I ever seen or heard of a troop commander who had the enthusiasm to give instruction in packing. As regularly as any other drill the men were required to "put on the rigging," make up packs, put them on, and make the "diamond hitch." He was laughed at as a crank, and that was all the encouragement he received.

I need not tell how the recruit needs setting up for the heavy artillery service. Previous remarks apply upon this point, with the additional emphasis that the heavy artilleryman has hard work to do in the service of all of our heavy ordnance, and hence should have a full muscular development to fit him for his work.

Which is of the greater importance, his service as an artilleryman, or as an infantryman, I will not pretend to say, but it would *look* as though his especial duty as an artilleryman should be a little more kept in view. The artillery is organized into batteries and battalions according to the infantry tactics; all formations for roll calls, and for all garrison duty are as infantry, and I never have seen or heard of a garrison that was organized or drilled by the heavy artillery tactics, except for heavy-gun drill.

But the artilleryman, like the cavalryman, has much more to do to get his thorough training. He has siege, sea-coast, and

standing-gun drill with field pieces to learn. He has the light field mortar, the heavy siege and sea-coast mortars, mechanical manœuvres with all, and target practice with all, as parts of his practical education. Until he has learned them, and learned them well, he cannot hope to be a thorough artilleryman, and I fear, therefore, that the majority of us cannot claim the title except in name. It is true that we are very greatly handicapped by the want of modern ordnance, and by the fact that we live in forts, many of which are unfavorably located for heavy-gun practice even with what we have.

In the field artillery we have a service in which the horse becomes a vital factor. Here we must have skillful riders and drivers. All the remarks that have been made about riding and training horses in the cavalry apply here with equal force, so we can pass on to the practical work of the battery.

It has been well remarked by an eminent authority that the future battery, to be effective, must be able to march and shoot; to march so as to accompany the army and come early on the field of battle; and when there, to do execution by the quality and quantity of its fire.

For parade purposes and to pass inspection it may be very well to have accuracy of line or column; doubtless this is essential to a certain degree, but it is not and should not be the end and aim sought. The movements should be few and simple. There should be no more than can be easily executed on the field of battle, and the greatest attention should be given to road work and target practice. Here as elsewhere perfunctoriness and routine have no place. Dull, slow, stupid drills at slow gaits, are a burden; horses and men both suffer and learn but little.

The heavy-artilleryman's work is particularly hard. He must be able to march, for he must accompany an army in the field, and be at hand for instant and constant service when siege works are to be erected and heavy siege guns placed and manned. For this reason he must know how to march as well as any footman, be armed as a footman, and, when occasion calls, and he is not busy with siege or field works, to fight as a footman. But, again, he should be given a chance to learn his proper duties, be encouraged to perfect himself in this special sphere, and never be called upon, except in the direst extremity, for other than this special work.

Our light battery drill should most decidedly be made practical. Take the battery out and use it as though it were in actual service. Go through the practical work of disabling the battery by taking off wheels, taking out horses, all as though the damage had been done by enemy's fire, then make the most of what has not been designated as disabled. A wheel here, a gun there, a horse somewhere else, can be found still sound, and with them a part of the battery can be made of service, when, as it stood, it was all unserviceable and unfit to fire a shot. This is not original, it comes from reading the letters of Prince Hohenlohe. His fifth letter tells of just such work, and as a practical application of mechanical manœuvre work it is beyond all praise.

The character and location of the stations of the light batteries has in some cases precluded all target practice for want of a safe range. In time, as Fort Riley is completed and filled up to its complement, this feature will have disappeared. But in the meantime I have just now about completed my tour with the light battery and have not fired a shot.

In road work we have much to learn. We have a heavy load to pull, and we must do it with the minimum of fatigue to our horses. Streams are to be crossed, ditches, sloughs, to be got over or through, and this certainly cannot be taught on the smooth parade or drill ground, and as certainly the teaching should not be left until active service calls us to meet such conditions. We need instruction in the best methods and means of rapidly throwing up partial shelter for our guns and men, but it should be given while there is time for detailed and quiet instruction. It should not be left for the rush and hurry of the actual campaign, when seconds count either for or against success.

Having now followed all of our arms of service through a part of their practical education in out-door work let us look upon them in winter quarters. Here, although they may rest, they need not hibernate.

The gymnasium now assumes the greatest prominence.

My experience and observation have taught me that men do not object to work when they see some useful end accomplished. They become disgusted, wearied, inattentive, only when they can see no benefit to be derived.

Gymnastic training is always of benefit, and its benefits can be seen by the average soldier. Interest can always be kept up

and attention secured with but a moiety of ingenuity and patience. But the training should be the free and unconstrained exercise of the gymnasium proper, and not the rigid, mechanical, perfunctory, military exercise in the ranks at the various setting up exercises. Ring swings, parallel bars, jumping cords, vaulting horses, horizontal bars, the climbing and swinging ladders, climbing pegs, the inclined plane,—all give variety and keep up interest. Their use brings every muscle into play, and they are all within the reach of every post quartermaster's carpenter and blacksmith shop for the material and labor necessary for their construction. Boxing gloves, pounding bags, broadswords, and all the sporting goods add variety and interest to the sport, and they are easily to be had by a popular subscription. On proper representation it is believed all these articles would be furnished by the Government just as much as mattresses and pillows, arms and accoutrements.

Among the practical things most essential to a soldier's education is the art of tying a proper knot. The infantryman needs it to lash his load on the wagons, and for many incidental uses. The cavalryman needs it to hitch his horse, mend his lariat, and for many other uses. The artilleryman needs it most of all in his work with heavy guns. With it all are benefitted; without it, all are just so much the less efficient.

This can be made part of the winter's work. Once start it and it will be found as interesting to the soldier as to the sailor.

A corps of expert signalmen and telegraphers is of the greatest good to an army. Spasmodic attempts have been made from time to time by individuals for self-improvement, but, as a rule, these have been abortive through lack of interest and support, and a lack of benefit after it had been learned, upon the part of those who had learned the art. But I believe that much could be done if an active interest in, and a strong incentive were held forth, for practical improvement in this art. Let wires be put up, instruments put in, and a circuit be established throughout the post. Many steps could be saved, much inconvenience obviated, and in a very short time there would be a fair number of men able to send and to receive messages, and ready to be called upon for practical field work.

Gallery practice is one of the duties that must receive attention in the winter months. Let it be instituted as play more than as a duty. Excite emulation, let small prizes be given for good

scores, and let the men feel that they are released from the constraint now too often felt from rigid rules and perfunctory attention, and better results will be obtained.

Much practical instruction could be given to our men if their officers could only be induced to impart some of their information in the form of lectures to be given evenings in the post school or recreation hall. I served in one garrison where the whole winter through there were weekly readings and lectures for the benefit of the men. The crowded house and earnest attention were evidence enough of the interest that was felt, and the probable good that was obtained.

I have written in vain if it is not apparent that the practical instruction and education of the soldier is of the greatest importance. I have wasted my time if it is not seen that such instruction is not only what he needs, but that its full development will consume all the time at his disposal. Theoretical instruction as required by statute and regulation may be all very well in its place. Our soldiers may be all the better for having brains that have been developed by mental training in "the three R's" or in matters of general education or science. But that is a matter which should concern us in the selection of our recruits, and not after they are enlisted. Men do not enlist to be sent to school or to acquire an academic education.

In my opinion the whole scheme of army education is on a wrong basis. I believe we should strive with all our might to secure good and efficient field soldiers and not an army of "book men." The farmer's boy with his limited education, the city laborer hardly able to read or write, the emigrant just landed, unable to speak our language, the poor mechanic who cannot earn a living by his trade,—these are the materials from which our Army is made. They are physically strong and robust because they have lived and worked in the open air, and have not been housed up in school. They have the qualifications necessary for our soldiers better developed than those whose education may have been more advanced, and they readily learn the practical duties that their work demands.

Now and then we find a man who is desirous of advancing farther and acquiring some education. He is the exception and not the rule, and I fully believe and am convinced that the system of theoretical instruction, education, evangelization, and reformation, now so eagerly sought by some few among us, is not needed,

is not wanted, and, if enforced, will be but another cause for desertion.

I have drawn no fancy sketch of the practical duties of the soldier. I have tried to keep within bounds on all occasions. How true or how false the picture may be is not for me to decide. I have tried, however, to show wherein we fail, and how much our future battles, our future successes in the Army, depend upon our close and devoted attention to the practical education of the soldier.

THE BATTLE OF PLATTSBURG.

A Letter from General Alexander Macomb, U. S. A., to General Jonathan Williams.

MY Dear Sir: My long silence you must attribute to anything else than a want of respect, affection or to forgetfulness—indeed I did not like to be writing until I could inform you of some exploits worthy of the *Corps*. I now have the proud satisfaction to inform you that the most wonderful success has attended our arms in this quarter both by land and by water. The Governor-General of the Canadas finding that our forces in this quarter had been greatly diminished by the departure of the division under Major-General Brown, had determined to collect all the disposable force in Lower Canada and invade this part of the country, boasting that he would winter at Crown Point or White Hall. His flotilla being also ready for sea and manned by the finest sailors and marines the British navy can boast, he determined to crush in one campaign the whole American force on Lake Champlain and its vicinity. He arrived at the village of Champlain on the 1st of the month and then issued his proclamations and orders tending to dissuade the loyal inhabitants from their allegiance and inviting them to furnish his army with provisions. Stating that he warred not against the unoffending citizens, but the Government which had declared war against his Britannic majesty without reason or provocation and against all those who should fight in support of so base a Government. He proceeded on by slow marches until the 6th when he arrived within six miles of the village of Plattsburg where he was met by the militia and a part of the garrison—a battle ensued notwithstanding he had ten times our number—we fell back disputing every inch of ground, killed many of his men and officers. This day cost him a Colonel Wellington, of the Buffs, several other officers and about 200 men. He succeeded in driving us across the Saranack and he quietly encamped before the village. Day and night we skirmished at the several bridges and fords to prevent his light troops getting in our rear. The militia

had collected under General Moore to the amount of about 700—our regular force did not exceed 1500 for duty—five hundred were constantly fighting and the rest working to complete the defenses of our position, having three redoubts flanking each other and two block houses at a short distance in our rear.

The British forces we could not believe amounted to more than 5000, notwithstanding the reports from all directions were received estimating them at from 15,000 to 20,000. They encamped under cover of the woods, to conceal their number, but it is well ascertained they amounted to 14,000 of the finest troops ever seen in America, commanded by Sir George Prevost in person, aided by Major-Generals De Rottenburg, Brisbane, Robinson, Powers, Baynes, Sir Lindsey Beckwith, and many others whose names I have not learned, forming four divisions consisting of 4 troops 19th Light Dragoons, 4 companies Royal Artillery, corps of royal sappers and miners, rocketters and engineers, the 27th, 1st Batt., 58th, 5th, 3d, forming 1st division; 88th, 39th, 76th, 27th, (3d Batt.) the 2d division; 8th, 13th, 49th, 6th, the 3d division and De

Swiss Regt. Canadian Chasseurs, Regt. Voltigeurs and light infantry, the 4th or light brigade. These troops, all most superbly dressed and equipped, just from France, the conquerors of the world, holding a sovereign contempt for all mankind, appeared before this place and after investing it for five days and bombarding the forts for one day from seven batteries, which were all silenced by our superior fire, raised the siege on the 11th and precipitately retreated to Canada leaving provisions, ammunition, tents, marques and thousand other things behind, as well as their sick and wounded. We pursued with our light troops and made many prisoners and have covered the escape of about 500 deserters. The militia and volunteers from New York and Vermont finding I would not surrender the works flocked in by thousands and the British commander really was in danger of losing his whole army.

He was repulsed in several attempts to cross the river with ladders to storm the works and completely foiled by the militia and regulars in all his attempts. He must have lost in killed and wounded about 300 men, prisoners 100, deserters 500, by sickness and exposure 1000 at least. The squadron engaged ours at anchor in full view of the contending armies—in two hours they struck to our vessels—the bombardment commenced at the same moment the fleets engaged. The Chief Engineer was Colonel

Hughes, Dan'l Hughes' brother, major now in our service. Totten has covered himself with glory, and the other engineers, De Russey and Trescot, have distinguished themselves. Indeed, the artillery was served with a precision that astonished the British officers. Our killed and wounded amount to 99. The rockets did us but little harm, they were more frightful than dangerous. Take it altogether, considering our small forces and means, it is the most glorious affair that has happened this war. An army and navy defeated by inferior numbers at one and the same time is without a parallel in our history. I am so run down with calls and have such an incessant application for my signature to vouchers and accounts that I have not time to write more. You see I write in the *Swift* style and will conclude though not without assuring you of the unalterable respect, affection and devotion with which I remain, my Dear General, your affectionate and faithful friend and servant,

ALEX. MACOMB,

PLATTSBURG, Sept. 18, 1814.

De Russey will make a sketch of the enemy's position and ours on the other side. (See map.)

Reprints and Translations.

A SUMMER NIGHT'S DREAM.

Translated from the German.

BY CAPTAIN GAWNE, FIRST ROYAL LANCASHIRE REGIMENT.

(Reprinted from the United Service Magazine, London.)

PART II.—WAR REMINISCENCES.

H ALLEN now explained to me in detail his "creed," as he called it. I listened in silence. My thoughts carried me back to the old battle-fields, and brought before me the contrast presented by the ideas of that time to those which Hallen was setting forth.

I recalled my first battle in France. We did not arrive on the field till late in the day. We crossed it where the battle had been fiercest. What a sight it was! I was already familiar with the sight of the dead and the mangled, and with the sound of the cries of the wounded, but not with what now met my eyes. The field was literally strewn with men who had left the ranks, and were doing nothing. Whole battalions could have been formed from them. From where we stood you could count hundreds. Some were lying down, their rifles pointing to the front, as if they were still in the firing line, and were expecting the enemy to attack them at any moment. These had evidently remained behind lying down, when the more courageous had advanced. Others had squatted like hares in the furrows. Wherever a bush or ditch gave shelter, there were men to be seen, who in some cases had made themselves very comfortable. All these men gazed at us without showing the least interest. The fact that we belonged to another army corps seemed to be a sufficient excuse for treating us with blank indifference. I heard them say: "These fellows, like the others, are going to let themselves be shot."

The men nearest me bore on their shoulder-straps the number of a famous regiment. I turned to look at my own men. They began to seem uneasy. Some were pale. I myself was conscious of the depressing effect produced on me by what I saw. If the fire of the breech-loader, which we were now to face for the first time, while already its continuous roll sounded in our ears had so disorganized this regiment, what would happen to me?

I presently met with an officer of the Reserve. I invited him to join my company. He followed without uttering a word. To my annoyance, my company had to make a short halt to allow the remainder of the battalion to come up; we therefore gathered the stragglers about us, and

formed a strong party of them under the command of this officer. Two men, a lance-corporal and a private, came of their own accord and asked permission to join us; all the others were very half-hearted, and had to be brought in. Those who could do so sneaked away. The only effect of our collecting these stragglers was to produce a bad impression on my own men, for, as soon as we came under the enemy's fire in some vineyards and extended, the reserve officer and his comrades disappeared for good and all. I reproached myself afterwards with not having asked his name. Only the two men that had voluntarily joined us remained, and behaved gallantly to the end. When I dismissed them, they asked me for a few words on paper to show their captain where they had been. I willingly granted their request. I stated in my note how well they had behaved, and that even had they had not asked me to write, I should have done so.

During our advance, before we came under any really serious fire, and while only the whistle of an occasional stray bullet could be heard, we saw six men, one behind the other in a long cue, cowering at the back of a tree. Afterwards I saw this sight so often that I became accustomed to it. Who did not? At the time it was new to me. The tree I speak of was not thick enough to give cover even to one man. In this instance the sixth was a sergeant. Near the tree there were little irregularities of ground which would have given good cover to all six.

"And this," said I to myself as I now thought over the matter, "was the result of three years' careful education in the independent use of cover. Would not Frederick's soldiers, who knew nothing about fighting independently, have been ashamed to present such a spectacle to passing troops?"

We were severely engaged on the following day. The attack had to be hurried on. I hastened forward, fearing to arrive too late, and was met by a counter attack of the enemy. The remainder of our battalion, mixed up with another regiment, was on our left. There the fight was at its fiercest, and the noise deafening. On our right, where there was cover, I could observe no signs of fighting. My duty seemed clear; first to push aside the skirmishers opposed to me, and then to fall on the flank of the formed body of the enemy that was in front of our other companies. I threw out skirmishers, and opened a heavy fire at 300 yards. I then marched the support in company column, with drums beating to the attack. As, however, the enemy suddenly appeared in strength behind his firing line, and looked as if he meant to attack my left, I, as soon as I had brought my support up to the firing line, gave the command to fire a "four deep volley." In consequence of the noise of the skirmishers' fire, this utterly failed. The head of my small column began firing independently. Every one dropped on the knee. The losses were already considerable. "There is nothing for it but to get on," said I to myself, and I actually succeeded after a few shots in making the company rush farther forward, cheering. This was largely due to my brave drummer, Schult, for, without flinching from my side, he beat "the charge" continuously with all his might. We saw the enemy stop his advance, but, on the other hand, his fire became

severe. My forward rush had only lasted fifty paces, when my men threw themselves down in order to return the fire. Although the company was in disorder, there was still a group holding together. Even the skirmishers nearest this group were attracted unconsciously towards it. I let the quick fire rattle for a short time, and then sprang to the front, shouting "March, march; hurrah!" My brave lieutenant similarly urged forward the other flank of the column. Although our voices were stifled, still the example given by the captain and lieutenant was visible to all our men, and had the desired effect. The fire of the closed groups was ceasing, and the greater part of the company was on its feet when a senior officer galloped up, shouting: "Captain, extend your men, or you will all be killed." There was no necessity for me to repeat this order; the words had had a magical effect. In a second, the company had scattered in every direction except that of the enemy. I saw no more of most of my men during the fight, but they turned up all right at the bivouac in the evening. We lost about seventy men during the attack I have just described. If the senior officer had not interposed, the further advance would no doubt have been very costly. But if we had driven off the enemy's skirmishers, as I felt sure we should have done, we should have repaid our losses with interest on them and on the men beyond on whose flank we should then have struck. As things were, we had escaped the loss of any more men, but we had also lost the chance of success.

Whilst I was now, long after the event, thinking over the attack and my mistakes in it, and considering how far they were responsible for the unlucky interference of the senior officer, suddenly the picture of another battle-field presented itself to me.

I was in a narrow forest path. The forest was large, and so thick that it was difficult for even single men to move off the path. In front, I heard a hot musketry fire. There were no troops in the path, only a few senior officers, who were searching for their men. On either side of the path the wood was full of men, who were taking no part in the fight. The greater portion of a division had crumbled away in the forest. Instead of keeping the men together on the roads and paths, we had sent them into the forest in extended order. Now we were in despair. We wanted to get our men together again, but could not succeed in doing so. I went to one of the men near me, who were among the trees doing nothing.

"What are you doing here?" I asked.

"I am Shiltze of the 10th Company."

"Where is your captain?"

"I don't know."

"Where is your Zug leader?"

"I don't know that either."

"Why are you not fighting?"

"There is no enemy here."

"Why don't you go forward, then, where the enemy is?"

"I have no orders to do so."

"If you don't go forward and can't shoot, why don't you join yourself to the other people close to you?"

"They belong to another company. No orders to reform have been given."

As I thought over this scene, I recalled Hallen's words. "If you find fault with such a man he will answer, if not exactly in these words, at least in their sense: 'What do you want me to do? I am fighting in dispersed order.'" It seems comical, but it is very true and sad.

I continued my musings. Hallen's words recurred to me. "When the leaders are gone, the example that will be followed by nearly all will be that of the weak, of the men who lose their heads, and of the cowards." I thought of Lance-Corporal Arnold's case.

Arnold was one of the best men of my company. You might trust him with your life. He was touchingly subordinate. He was a pattern soldier, a splendid shot, and a good patrol leader. He would have made an excellent sergeant but for his weak character.

We were opposite to and about five hundred paces from an extended position of the enemy, and under a brisk fire. My entire company had by this time been necessarily extended. With dismay, I marked the growing uneasiness of my men without being able to do anything to stop it. Every one was lying down and firing. I could see rifles whose stocks never left the earth. The upward direction of the muzzles was particularly noticeable at one part of the line. On looking closer, I could see that there was a little rise in the ground in front which prevented the men from seeing the enemy. This did not, however, stop the men in question from firing away as hotly as the others, and sending all their bullets over the rise into space. To my great astonishment, I saw among these madmen Lance-Corporal Arnold. Full of anger I rushed at him, seized him by the shoulder and shouted "What are you shooting at? You can't see the enemy." Not feeling certain that amidst the noise he understood my words, I accompanied them with lively and unmistakable gestures. Arnold looked round, but his gaze was vacant. Clearly, he did not recognize his own captain. Then, hearing a few shots whistle close by us, he flopped down again to fire harder than ever. My anger got the better of me. I hit him with my sword so hard over the helmet as to make a great dint in it, and to knock it off his head in spite of the chin chain. This had an effect. The man sprang on to his knee as if struck by lightning. His face was deadly pale, and every limb was quivering. I could not understand what he said, but from his face I saw that he now recognized me. Never shall I forget his look, partly pleading, partly reproachful, like the look in a stag's eye when the hunter approaches to cut its throat. He fell down again all in a heap, as though crushed, his eyes staring at the ground. This, however, lasted only an instant. He jumped up quickly, grasped the arms of the men nearest him, and encouraged them to advance with him to the place I had indicated. As his comrades did not understand him at once he crept forward alone, and although endangered by the wild fire of the men who remained behind, commenced a steady, well-aimed fire from the rising ground. After having with trouble and by forcible means, induced the other men to move up to where Arnold was, I went off to the other flank of the company. I never saw Arnold again; he fell in this fight.

"Poor man," thought I, "what a parting, after you had been for full two years and a half my most faithful, dependent and hardworking subordinate!" This is the evil result of fighting in crowds without leaders. The best men fall victims to bad examples.

It seemed to me now as if I saw Arnold deadly white and with that last beseeching look, standing before me.

"Ah," said I, "how could you, a first-class shot, an excellent patrol leader, thus forget yourself so far as to loose off your cartridges into the sky?"

"Oh, Captain," he answered in his soft voice, "forgive me; I did not know what I was doing. I was not myself."

"But you had learnt, and learnt better than others, how a soldier should behave in action. You should have been an example to the others."

"Yes, Captain, and I wanted to be such; but if you see the others get wild, if shots are sounding in your ears from all sides, if the bullets are whistling close past you, and you see comrades falling maimed and wounded around, you, too, yourself bleeding, grow wild and forget everything you have learnt. If we could have only seen the Captain now and then, and heard his orders, things would not have become so bad; but the perpetual rattle of the shots made us deaf and stupid. At first, I would not allow this wild shooting at any price. I knocked down Hartman's rifle because he was shooting into the sky. I put Krep's sights right, on finding him shooting at 600 yards with his flap down at point-blank range. But all this was no good. One set the other off, and so the firing became wilder and wilder. When the noise became so bad and the smoke so thick that you could not see your hand before you; when Kreps was hit by a ball and began to yell, when Schuhmacher, who comes from my village, and with whom I went to school, was hit in the head, fell and looked up at me with the glassy eye of death; well, then I could neither see nor hear, and what I did I cannot say. But when the captain hit me, I became miserable, so miserable that I wished to live no longer. I wanted to keep on running towards the enemy, all by myself, but the others held me back. After a little, I saw that the enemy was shooting less and that on the flank where the captain was the fire was getting weaker. 'Where is the captain?' I shouted. I ran to the left, always asking the same question as I went, till some one said that the captain had gone forward. Then I ran back as hard as I could to the others, and said, 'We must push on. It would never do for us to let the captain be by himself.' They said, however, that they did not know where the captain was and did not care either. Only Kläsing and Meyer said they would come with me. Then a great fear suddenly seized me, 'If the captain should think you meant to stop behind!' 'I'd rather be killed,' thought I. 'Come along after the captain,' shouted I, and I ran and the other two ran after me. We reached a firing line of our people, belonging to another regiment. I thought I had come too much to the left, and turning to the right went along the firing line; but I came across only strangers. At last we reached the end of the line; but farther on, amongst some bushes, I thought I saw firing

and ran towards it. Suddenly fire came from right and left. We were between friend and foe. I felt I was hit, and fell, and know nothing farther"*

"Brave man!" exclaimed I; "I knew you would be true to death. How it pains me to think that I had to embitter the last hours of your life by rough treatment. But you had a fine death, and your memory shall ever be held in honor."

While still much affected by these sad recollections, I suddenly again heard my friend's sonorous voice.

"He who fires, when in the ranks, without orders will be severely punished; so also will the man be punished who throws himself without orders on the ground, or without orders uses his magazine.

"Every soldier who fires without aiming, who uses the wrong sight, who spoils a volley by pulling his trigger too soon, or does not instantly stop firing on the sound of the leader's whistle, will, after the fight, be reproved before the assembled company, unless he has afterwards atoned for his mistake by distinguished conduct.

"Whoever is found with an empty or partially empty magazine must explain the cause of this; and should he be found guilty of having neglected an opportunity for refilling it, he will be severely punished.

"Whoever is found without permission in rear of the fighting troops alone, idle, and not wounded, or who without orders carries wounded men out of the fight, will be tried by court-martial for leaving the ranks. Should he not be a private, he will be punished more severely in proportion to his rank."

THE DREAM.

At first I did not know where I was when I heard these words. There seemed to be a mist in front of my eyes. Gradually it cleared away, and before my friend ceased speaking, to my astonishment, I found myself on a battle-field entirely new to me.

We were on a gentle slope, which rose gradually towards our left, and was crowned by our artillery. About 550 yards to the front of this slope, flowed a brook in a trough-like hollow. On our side, the bank was covered with thick brushwood, fairly large woods, and a few farm buildings. On the further side, the country was open. It was level for some 550 to 650 yards, and then rose gently. On the top of this rise was the enemy. On the right of our guns was a road leading across the valley towards the heights held by the enemy. The enemy's artillery was astride of this road. It was rather retired, and its front was covered by infantry occupying shelter trenches and the houses near the road. I was opposite the enemy's right wing. This was posted on a broad, gently sloping salient, on which was a village. You could see, in front and on both sides of the village, shelter trenches recently thrown up. Gently undulating ground lay in continuation of this wing, and was apparently commanded by the village height. This height was about 1300 yards distant

* Lance-Corporal Meyer, who was with Arnold till the latter's death, told me afterwards these particulars about Arnold's behavior.

from the brook. The artillery of both armies was vigorously engaged. The opposing guns were about 2200 yards distant from each other. Whenever we advanced to the attack, we should find no cover except close to the brook on our side of it, and in the dead angle at the foot of the village height some 700 yards from the shelter trenches.

Looking round, I saw three of our battalions standing sheltered by the height on which I was. I recognized in their colonel Hallen, who was addressing his regiment.

He had just finished announcing the punishments that would be inflicted according to the principles I have quoted from him. He now proceeded as follows :

"I know none of you have any intention of allowing yourselves to be found guilty of such conduct. But during the fight, when killed and wounded are lying around us, it sometimes happens that a few men lose their heads and forget the best intentions. It is the duty of the strong to talk to such weak men, so as to make them regain their courage and not disgrace the regiment. Should any one of you find himself losing his head or courage, he must look at his officers, and if they have fallen, there will be the sergeants and other brave men whose example will put him right again.

"Comrades, our duty to-day is to uphold the famous old name of the regiment. We have to storm the village which you will see opposite you on reaching the top of this hill. Our regiment is selected for this task. We will show ourselves worthy of this honor and of the great confidence placed in us by our superiors. Our lives belong to the Emperor. None of us has any right to his life so long as the village is held by the enemy. We will all perish before that village, or before the sun goes down it shall be in our hands. His Majesty, the Emperor, the well-being of our country, and the honor of the regiment demand this of us."

Thereon rose a cheer for the Emperor again and again, till the mighty sound of nearly 3000 voices penetrated far and wide over the fields, even to the enemy's position.

I saw the eyes of the men lighted by a calm enthusiasm. I thought of my first battle in the French war. As we went into the battle, which had been raging for some hours, the colonel addressed us in these few simple words :

"Now, men, if those on there," pointing to the troops in front, "can't manage the business, we will."

A joyous cheer answered him.

Our enthusiasm seemed to me the louder, stormier and more exaggerated of the two. Here, in Hallen's regiment, the enthusiasm was quieter, more earnest and determined. The threat of punishment had had its effect. All were conscious of the gravity of the occasion, but they were also determined to show themselves equal to it.

I must own I prefer the quiet enthusiasm. It stays longer.

The Colonel (Hallen) now took the majors to the top of the hill, and gave his instructions. The salient height was to be taken first. Then, pivoting on this height, the brigade was to wheel round it to the right, and

so fall on the enemy's right flank. The work allotted to the first brigade was as follows: The 1st Regiment (Hallen's) was to take the village, its left flank being covered by the 2d Regiment, which would also give support if necessary. When the village height was taken, the 2d Regiment was to complete the outflanking of the enemy. The 4th Regiment was to form the reserve, and would move up to where the 1st Regiment now was. The 3d Regiment, which had formed the advance guard, and was now occupying the wood in front of the artillery, was to carry the enemy's guns.

As regards the 1st Regiment, the 1st and 2d battalions were to form the fighting line and the 3d the regimental reserve. The colonel carefully pointed out the objectives for the outer flanks of the 1st and 2d battalions. With delight he called attention to the fact that the enemy's guns had ceased firing, and that our own had now, for some time past, been shelling the village and its shelter trenches. The village was already in flames.

The two battalions were to advance without firing as far as the foot of the hill, rest there a moment to pull themselves together, then advance, and when about 500 yards from the enemy's shelter trenches, open fire on them.

From the state of affairs, it was probable that the order to advance would soon arrive. The regiment was to deploy and prepare for the advance. Any time that might remain was to be used to explain to the junior officers the nature of the coming work; but they were not to be exposed to the enemy's view.

The regiment now deployed. I admired the bearing of the men and the smart way in which they handled their rifles. Every movement was as if on an ordinary parade. "Is this peculiar to the regiment, or have the customs of our army changed in this respect? That would indeed be a step forward," thought I.

Then a sad feeling came over me. "This accurate drill, these strict orders, this regularity, this front, what will it all be probably in half an hour? Chaos?"

I did not think about the loss. If you wish to conquer, you must know how to die. We are all destined to die, and there can be no more beautiful death than that of the battle-field. As I moved forward, and the solemn feeling of the coming battle came over me, I sang the old soldier song—

Earth no fairer fate can show
Than his who's slain with face to foe.
Those on turf or heather sleeping
Ask not for thy needless weeping.
In narrow bed must each at last
Alone to Death's grim ranks have past;
While here like new-mown grass there lie
Men at whose side 'tis well to die.

So sang the mercenaries of past centuries. We who are born in an age when all alike share the common duty, we who have to defend hearth and home and national honor, the noblest possessions of mankind, allow ourselves to be put to shame by these mercenaries.

I do not know how long I had followed this train of thought. I was

startled out of it by seeing that the enemy's lines were all at once showing renewed activity. Their artillery, which had of late ceased firing, had begun again with great vigor. What was the reason of this? Ah! the 3d Regiment was, on both sides of the road, advancing against the enemy's guns. There were five or six companies thrown forward, mostly in thick skirmishing lines. The hostile infantry in this part of the field kept up a hot fire.

"My God," thought I, "are we going to again commit the old mistake of attacking only from one side, and with only a weak advanced guard? These troops, as they will receive the combined fire of the whole of the enemy's front, will assuredly be annihilated. Then the others will be forced to make a hasty attack, not in order to drive back the enemy, but to try to restore the balance of the fight. It would be a bad blunder, and the sure cause of disaster."

But no; a shell from the enemy comes in my direction, and bursts 100 yards in front, on the top of the hill. At the same time I heard behind me loud cheering. This came from the firing line of the 1st Regiment, advancing over the hill and answering the enemy's greeting. I saw, farther to the left, the 2d Regiment also preparing to advance. "Ah," thought I; "now the enemy's guns will have so many targets at the same time that they will get confused; moreover, every part of the enemy's front will have its work cut out to defend itself and will not be able to help the others. A united attack is the only way of succeeding against a united front."

As soon as the enemy's troops on the village height perceived the advance of the 1st Regiment they deployed thick firing lines, occupying the shelter trenches in front and on the sides of the village. Our artillery had been on the look-out for this moment. A devastating, quick, shrapnel fire burst over these firing lines. We saw, amid the thick smoke of the bursting shells, that the enemy was becoming disordered, that many threw themselves down and that others rushed back to the village. It was only in disorder, and by the use of fresh troops that the enemy finally succeeded in fully occupying the shelter trenches. Then the usual scene immediately presented itself. The line of little clouds of white smoke spread out and surrounded the entire height. Although the range was 1700 yards, the bullets were already whistling about our heads. "Let them shoot," cried out Colonel V. Hallen, from behind his skirmishers. "Go on to five hundred yards distance, and we will make them sing small. The artillery will look after them till then," he added, in a lower tone.

On observing more closely the firing line of the 1st Regiment I perceived that it consisted of single rank *Züge* in close order. "Ah! Hallen's fire tactics," shouted I, with joy; for my old dislike of these tactics had changed on a closer and calmer observation to interest and liking. Yes; everything was carried on as Hallen had described it to me.

The companies were divided like rifle companies into four sections. My friend had said to me, "If we keep to the present sub-division of the infantry company, a *Zug* at war strength in single rank formation would be too strong for a leader to handle. On the other hand, half *Züge* would be too weak. Besides which it would be very difficult to provide six

officers and as many sergeants for the fire units. If you reckon a company at 250 rank and file, and then deduct musicians, men on command, stretcher bearers, ammunition carriers and battle police (of these latter more anon), and finally a small percentage of sick, you will get the strength of the company about 200 for the first battle. That is about fifty men a Zug, and that, I believe, to be its proper strength. If during the campaign the company becomes weaker you can divide it into only two or three Züge, for the number of leaders decreases as fast if not faster than that of the men. Even if, at last, the company consists only of one Zug, and that is led by a reserve officer, it still remains the company. Our organization must not depend on the probable losses. We fight our first battle at nearly full war strength. On the result of that battle most likely depends the fate of the campaign. Our fire units must be neither inconveniently strong nor too weak.

Hallen divided each Zug into half Züge, each half Zug into three sections. Each Zug had a second leader, who, when the first leader fell, took his place. One of the section leaders was told off to take the second leader's place if necessary. The ranks of each section had similarly a second section leader, who had in turn his man to replace him.

"We must not," said Hallen, "leave it to chance whether when a leader falls his place is speedily taken by his successor or not. Many a man, who is neither ambitious or dashing, will take advantage of your not having settled the matter to keep himself in the background. Now a section must never be left without a leader even for a short time. Battalions and regiments can for a time dispense with leaders more easily than sections can."

The 1st and 2d battalions advanced side by side to the attack. Each battalion had two companies in the fighting line, and two in reserve. Of the leading companies the inner ones had each three Züge in the firing line and one in support; the flank companies had two Züge in the firing line and two in support. The firing line of each battalion was therefore about 260 yards long, and consisted of five Züge, each of which occupied a front of about 45 yards, with an interval of about 9 yards between Züge. The battalion interval in the firing line was about 45 yards.

The leaders of the companies in the firing line were still mounted and were riding, accompanied by their company buglers about 110 yards behind the firing line. Behind followed the supports at about 330 yards from the front. They were either in one or two ranks.

The battalion reserve was in line.

All the leaders down to and including the section leaders, who were taken from the rank and file, wore whistles, of which every company took a reserve supply into the field. These single rank Züge marched and dressed by the centre, *i. e.*, by the man on the right flank of the second half Zug. This man took his direction in all movements from the section leader, who marched in front of the line. The direction was given either by an order from the leader as to the point to be taken up for marching on, or by the leader himself being followed. The second section leader was behind the right flank of the second half Zug and directed it. The section leaders marched behind their respective sections, and were responsible for the

maintenance of close order and discipline. From the time of the occupation of the shelter trenches on the village height by the enemy, our artillery had concentrated their fire on the enemy's guns. These, however, were determined not to be drawn off from their proper work. I saw how they were shelling that edge of the wood which was nearest to them, and the brushwood on the bank of the brook in front of us, choosing those places which the 1st Regiment would have to cross.

"They will have a hot reception on the other side of the brook," I thought. "How will the close order stand it? Through the wood and dense brushwood, over the deep wooded-depression of the brook, and then into the shrapnel quick fire. This first trial of the close order tactics is a hard one—too hard, I think."

I followed with great anxiety the movements of the firing line. It stepped forward cheerily and quickly till it reached the wood and brushwood. There the *Züge* opened out and divided in a variety of ways in order to pass quickly through the obstacles. They endeavored, as far as possible, to keep their places in line, and not to increase the front. I saw one *Zug* go through fairly open brushwood in single file. Another formed fours deep, so that four men, one behind the other, followed the same path. Others moved through in files of sections or half *Züge*. More extended regularly and left it to each man to find the best way he could. All this happened without hesitation. The wooded ground was passed with great speed. Clearly they had been well trained for such country.

As I had foreseen, scarcely had the first detachments emerged into the open than the massed shrapnel fire of the enemy opened upon them.

"Forward! Forward!" I shouted, in the greatest anxiety; "don't go back into the wood! Don't halt! Forward! The fire zone must be passed. Only a few hundred yards forward and the worst is over. The enemy is expending all his fire at this one range."

But these brave troops thought otherwise. To hurry forward in confusion and be dispersed was evidently contrary to their education. "Close, close," was heard on all sides. "Close," shouted the officers, holding up their swords for their *Züge* to rally on them. And amidst the deafening crash of the bursting shells, amidst the hailstorm of bullets and shell fragments, these little detachments endeavored to close their ranks, and to recover their order before doubling onward, out of the danger zone.

I felt ashamed. In the old dispersed order the officers in the firing line would have shouted as I did, "Forward," and hurried on with the nearest men to them. The other men, left to their fate, would most certainly have been unable to resist the magnetic attraction of the cover given by the wood, and have either stopped in it or hurried back into it. With the close order tactics the leaders being responsible for the cohesion of their *Züge*, knew this duty better.

"Should you all perish in this battle, victims of discipline and order," I shouted enthusiastically, "I will defend and admire you. He who finds fault with this knows not the source of success in war."

The rally was executed with great speed. The careful peace-training showed its effect. Many *Züge* encountering the devastating fire of the

enemy at the moment of closing had short periods of confusion. I saw many men in a momentary panic run back into the wood. But the shout of "close" everywhere soon recalled them to their senses, and made them turn about. Then the force of habit brought them back into the ranks. I saw two Züge throw themselves on the ground as one man, but some men soon got up again, and the captain hurrying up, succeeded in forming a single rank in close order, which, although not more than twelve or fifteen strong, marched bravely forward under the ensign whom the proverbial luck of youth had preserved.

"Halt! stand fast!" I heard a lieutenant command his Zug, when the first men who had been rallied wanted to rush forward. "If you are in such a hurry that you cannot wait for the others, I will put you through the manual exercise, here under fire until you are quiet."

That told; the officer's bearing showed clearly that his threat was not an empty boast. The Zug closed rapidly and stood still, although several men fell wounded.

"Without step; quick march," commands the leader quietly. He did not allow his men to break into the double till they were all marching quietly. I found myself obliged to confess that these methods of maintaining order and coolness were different from those of the dispersed fighting tactics.

The trial had succeeded magnificently. The losses had been considerable at some points. There was now no regular line, for each Zug, as soon as it had rallied, moved on without waiting for the others. But these little detachments were moving in close order on the object of the attack. What a picture of order only a few seconds after the horrible scene of destruction. The victims of the enemy's shells were not a few. Some were lying on the ground, others were trying to reach the protection of the wood.

What would have happened to one of the old extended firing lines in such a case? Under the influence of this murderous fire how many of the "individual warriors" would have hid themselves in the wood, how many would have hurried back to it? And even, if, under the leadership of the few remaining officers, a small part had gone forward, what could a few scattered groups have effected against the united fire of the enemy? Any one who has never been under fire may find instruction on this point on many a page of history. How much of the reserve would it have been necessary to bring into action in order to push forward men enough to reach the enemy at last with a united firing line? What a mixing up there would have been. How much time would have been lost? Moreover, even the losses would have been greater, because the time during which we should have been exposed to the enemy's fire, without the possibility of returning it, would have been greater. Yes, Hallen. The close order insures not only order, thorough control, and the greatest use of your power, but means also economy of strength and time.

The supports crossed the brook and the wooded ground just in the same way that the firing line had done. The supports of the flank companies, each consisting of two Züge, passed through by Züge, and closed in on leaving the wood. The commanders of companies were still riding: one of them had already been wounded. The enemy's guns greeted the

supports with a lively fire, but the shrapnels were not so numerous nor so well aimed as before. The supports, therefore, advanced without any great loss, and with as great speed as the others. The unaccustomed sight of the many dead and wounded was not without some effect. But, when the ranks had closed up, when the drums began to beat, and a loud hurrah went through the entire line, every one took heart and marched resolutely forward.

The Colonel did not allow the battalion reserves to pass over the hill till the supports were attracting the attention of the enemy's guns. The reserve then followed at a distance of about 600 yards, and only lost a few men by infantry fire in crossing the hill. I was astonished to see how easily and quickly such a large body of troops passed the difficult ground about the brook—no hesitation, no loss of time. Some companies advanced Zug by Zug. Each Zug moved the best way it could. Sometimes the Züge extended or advanced by four deep or filed off, etc. Other companies extended. The rally was by Züge. The company formation was regained during the advance. I did not know which to admire most, the dexterity shown in moving over such difficult ground, or the certainty of the rally.

"I do not know any company that could do that," I shouted. "If I took the four best company commanders in the army, and let them and their four companies go through such a place as this together, it would be a good fifteen or twenty minutes before they stood in ordered ranks on the other side. In their anxious efforts to keep their companies together they would first try to find some path or some spot where they could collect the company, and then pass the densest part of the ground in files or in sections. Then the whole company would cross the brook one by one at the best place. Then in order to assemble the company out of its Indian file, another point would be required for the rally. Considering that their men have been taught the dispersed order tactics, I must own that they would be right to keep them together. If they extended their companies in this wood, with bullets and shrapnel whizzing and screeching overhead, they would most likely never get their men together again.

You can only use the temporary extended order with close order troops. As these troops have been strictly trained to close together on all occasions, you can now rely on their rallying quickly. Only such troops can ever arrive at perfection in crossing any kind of country in large bodies in close order.

The battalion reserves, which had continued without hesitation their onward march, had not to sustain a heavy artillery fire. This was partly because the energy of the enemy's artillery was for the time exhausted, partly because it was otherwise employed. Only a few shells fell, enough to show that the arrival of these companies had not been unobserved. Infantry bullets whistled continuously and thickly, but did little damage; for the enemy's firing line was already engaged in paying attention to our firing line.

Let us return to these latter. Marching briskly and finally doubling, they had reached the cover at the foot of the height held by the enemy. Their advance was greatly assisted by our artillery, which was once more directing a very heavy fire on the village. Our well aimed shrapnel was evi-

dently annoying and disquieting the troops in the shelter trenches. Though they rained their bullets continuously over the front of attack they could not stop the advance of our firing line and its supports.

Having secured the flanks against surprise by pushing out patrols, a halt was called to recover breath and to prepare for the commencement of the fire period. The supports hastened to fill up the gaps in the firing line.

According to their regulations each company now decreased the interval between firing line Züge to four yards. They closed in on the battalion flanks, so that the consequent gap was in the centre of the firing line. If there had been a third company in the firing line the instructions provided that it would have closed on its centre Zug; in order that the inevitable gap might always be between companies, not between Züge of the same company.

At this moment the gap in the centre of each battalion firing line, which had been caused by the closing in and by the losses during the advance left more than enough room for two fresh Züge. The interval between battalions always remained twenty-five yards.

Properly, as Hallen had explained to me, this central gap in the firing line should have been filled up by a third company brought up from the battalion reserve. Each company would then have in its support the necessary reserve force for the fire period. In the present case, it did not appear to be wise to commence the attack with only the weakened Züge of the firing line; nor yet to await the arrival of the battalion reserve before opening fire. Therefore, a deviation was made from the usual custom, and each company of the fighting line reinforced the firing line with the fresh Zug.

During the advance the company leaders had already directed these reinforcing Züge towards the central gap in the firing line. They themselves now dismounted and joining the firing line took over the command of a Zug, wherever it seemed most necessary. The buglers remained with them.

In one company two Züge had suffered such heavy losses that they were combined for the further advance. The company leader placed himself at the head of this Zug. No fresh distribution took place. Each section remained under its leader or his substitute even if its members had decreased to three or four men. No difference was made because of the relative strength of the two Züge. The right-hand man of the left Zug was now the guide of the double Zug.

All this, being a matter of custom, was carried out very quickly. Afterwards, during the fight, I more than once saw two Züge of a company form as one without any friction.

Just as the first detachments of the reserve emerged from the edge of the wood the firing line was ready for the fight and began to mount the slope.

The sights were adjusted, and each man had some cartridges placed ready between the breast buttons of his coat. On the Züge of a company coming in sight of the enemy's line they halted together, and each fired a volley, standing. They then doubled on to a place whence they could fire lying down. The commands for this movement were "Ready," "Present,"

"Fire," "Load," and then immediately "Double march." As the centre of the firing lines of the regiment came in sight of the enemy first, and were therefore sooner under fire than the wings, they supported the advance of the latter by their volleys. The enemy's infantry on the village height had ceased firing a little time before. When, however, our artillery burst a fresh shower of shrapnel over their shelter trenches, and our firing line, whose helmets only were visible, thundered their first volley from the crest of the hill, the rolling fire of the opposing force began afresh with great vehemence. The enormous mass of their projectiles had a tremendous effect on us.

The first firing place was reached in the best order. The 1st Regiment now commenced on their side a brisk volley fire. The volleys were not always as crisp as one hears on parade. A great number of them were absolute failures, which sometimes led to the fire getting out of hand. When such a thing happened all the whistles sounded, and not only those in the *Züge* concerned, but all those of the neighboring *Züge*, unless they themselves happened not to be firing at the time. Not until every trace of irregular firing had been stopped in this manner, were the *Züge* again allowed to fire volleys at their own direction. The most ruthless means were employed against this irregular fire, and each officer was responsible for his command. I saw that, in the first moments of disorder, the *Zug* leaders and their under *Zug* leaders did not immediately rush at the men who were shooting wildly, but turned to their section leaders and peremptorily ordered them to go to their sections and use every means in their power to put an end to the excited firing. The leaders, whether officers, sergeants, or lance-corporals, were not allowed to content themselves with lying down looking on from cover, in rear of the firing line, but had to expose themselves when necessary to put an end to any disorder or restlessness in their detachments. They knew that after the fight no forbearance would be shown to any one who had neglected his duty in such matters. The chief method of keeping the men calm consisted in repressing any rising excitement, and punishing it by a longer pause in the firing.

Hallen had said: "One shot fired coolly is worth more than twenty nervous shots. The more fire pauses, and the longer they are, the better. We save cartridges, and therefore hit so many the more afterwards. When the whistle sounds all along the line, and all firing suddenly stops, so much the better. Whoever asserts that this will encourage the enemy to shoot better, knows nothing about war. Every soldier in the enemy's line knows full well that this uncanny silence will be the prelude to a louder peal of thunder. He ducks at once before the deadly blow which he expects. His uneasiness becomes greater, and will go on increasing when the silence is prolonged."

Among other things, I noticed that no blame was attached to a soldier if he pulled his trigger at the word of command of a neighboring *Zug* leader, neither was he blamed for not executing the order of his own leader; so long as order was maintained and he did not fire without word of command.

"That is the true old Prussian fire discipline," I exclaimed; "what on

earth made us doubt its impossibility so long? Was it not possible in the last century, when the losses were actually greater and occurred in a much shorter space of time than to-day, when battalions consisted of crimped foreigners and militia? It is true the modern rifle shoots three or four times as quickly as the old musket, but this made the old fire tactics ten times as ruthless."

Close order lines standing upright would dash their volleys in each other's faces at 100 yards distance. There are very few of Frederick's battles in which entire regiments, yes, even entire wings of the army, did not lose half their numbers in a few minutes. Yet the practicability of Zug volleys was not disputed then, though their volleys were much more slow and pedantic than those I am looking at.

The centre of the firing line was about 350 yards, and its wings 650 yards from the enemy. There was not much delay at this distance. After a few volleys the advance was carried on by rushes. This advance was left entirely to the discretion of the Zug leaders. The only hard and fast rule was, that when a Zug had advanced it must be followed by the others of its company as soon as possible. Now, from this it will be seen that the advance of the Züge of the same company had neither to be exactly simultaneous or in the same direction. The Zug which had taken the initiative was in front, the others had to follow as quickly as they could. On the other hand, each Zug must rise quickly and together, close up during the rush, and be halted in formation at the desired place before lying down.

It was a strict order that on a Zug advancing, the Züge on either side, if not clear of it by an interval of 25 yards, were immediately to cease firing, half-cock the rifles, and keep them in an upright position.

"The greatest obstacle to a dashing advance," said Hallen, "is not the danger from the enemy's bullets, every one anticipates and is prepared for that, but the losses which are inflicted in the rear by the rifles of your own comrades. This danger must be absolutely abolished or there can be no hope of success in an attack. Can this, however be accomplished so long as irregularity, getting out of hand, and mobs are regarded as inevitable? How to diminish the losses the enemy inflicts on us is a problem that many men have puzzled their heads over; but I have neither heard nor read of any suggestions as to the best means of avoiding the far greater losses caused by the fire of comrades in rear."

It can be easily understood that in such an advance by Zug rushes, where the Züge closed in towards the centre, the intervals between the Züge of a company were not always strictly preserved. When such an error occurred it was the duty of the leader of the Zug in question to rectify it during the next rush. It happened once that the flanks of two Züge overlapped, but no disturbance or difficulty ensued. The wings locked up without mixing, and where this occurred they fired in two ranks, the front rank lying down and the rear rank kneeling.

"Stand back," commanded an under Zug leader, a sergeant, to two men. They had been a little late both in rising and rushing forward, and were now endeavoring to push their way into their places after the Zug had closed without them, and were lying down.

"Don't make room for those lazy fellows," the sergeant shouted to the other men. So the laggards had to make a rear rank and fire kneeling while the others lay. "Kneel properly, and don't crouch," added the sergeant. "If you are the first in the next rush you will get your places again." I think there can be little doubt that these men *were* the first in the next rush.

"Up," shouted a lieutenant to his Zug, who after the rush had thrown themselves down hastily and in disorder without waiting for the order "down." "Up," shouted the sergeants, and threw themselves at their sections. "Up," repeated the officer, hitting over the shoulders with the flat of his sword a man who in his anxiety had begun to fire. By main force all were got up again, several were struck and fell again to the earth. "Without step; march," ordered the Zug leader. "Close." When the Zug was again in order, when the gaps left by the fallen were closed and the proper position taken up. "Down." In an instant all were lying prostrate and immediately afterwards cracked out an excellent volley.

"Are there not still many people who would call this a useless sacrifice of human life?" I asked myself. The Zug would have lost six men less if the leader had let them lie where they threw themselves at first. "And even if twenty men had fallen," I exclaimed, "I would stand up for this brave officer, who exposed himself more than any one else. Twenty disciplined men in order are worth more than forty out of hand, who blaze into the sky and hinder each other from shooting."

The left company had begun rushes almost at once. The right flank company, which was the farthest from the enemy, had advanced of its own accord. The central companies followed as soon as these had opened fire.

A central company had started the second rush, which then extended to the flanks by companies.

(To be continued.)

LETTERS ON ARTILLERY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN,

Translated by Major W. L. HASKIN, U. S. A.

XIV.

SHOULD THE ARTILLERY IN FUTURE AVOID COMING WITHIN REACH OF INFANTRY FIRE?

YOUR second objection causes me no surprise, for I have often heard it stated that since the artillery obtains an effect with shrapnel at 2200 yards, which is not sensibly increased at less ranges, it need no longer approach the enemy more nearly, and that it would expose itself needlessly to loss by advancing until within range of infantry projectiles. The conclusion is therefore reached that it should avoid exposure to infantry fire.

On many different occasions I have expressed to you a wholly different opinion, and have cited cases in which the artillery, whether upon the offensive or the defensive, should not, in my opinion, withdraw before the effective fire of infantry. I cannot now refrain from citing in support of what I have advanced, and as arguments in refutation of your opinion, different reasons which I have not hitherto sufficiently elucidated and which support my views.

The first of these reasons is that at a distance of 2200 yards, when from all quarters the infantry lines have approached each other, there is danger of confounding friend and enemy, and of cannonading one's own troops.

I once had occasion after a battle to compare the official report of a battery commander with that of a major commanding an infantry battalion. The first wrote: "At 3 o'clock I took position at the bifurcation of the roads which lead from M. to L. and R. I opened fire upon one of the enemy's battalions retreating upon the route from S. to R. until it disappeared in the hollow road. I observed that three of my shots struck the enemy. Distance 2500 paces." The report of the infantry major says: "I marched from S. upon R. to take part in the combat there, the object being the possession of the village. Three shells reached the battalion before it could be placed under cover in the hollow road near R." No two reports could possibly agree better. Upon measuring the distance upon the map, I found that from the bifurcation of the roads to the entrance to the hollow road was just 2500 paces. And it is a cool and brave captain who has committed such a grave error, and that at a distance of 2000 yards.

General von Dresky writes me upon the part he took in the battle of Le Mans. "On the 12th of January at break of day, the corps artillery of the III. Corps, received the order to support the attack directed against the height of Champagné. By the greatest good fortune we had found in the rough irregular ground an excellent position, which was thoroughly covered and could not be commanded by the enemy from any direction. We were going to fire upon the troops which we saw plainly before us upon the snow-covered field, when one of our officers, who had a very excellent field glass, assured me with the manner of a man who was certain of the fact, that the troops before us were Prussians. In order to be wholly sure I sent forward my adjutant with two mounted orderlies, and upon their return they reported that this was the fact. The French had already abandoned the height of Champagné." I will state in passing that the distance which separates the position occupied by Colonel von Dresky near the farm of Morinières, from the farm of the Rumaldières upon the height of Champagné, is about 2200 yards.

The mistake of firing upon one's own troops has occurred also when only smooth-bores were in use. Gotz von Berlichinger tells us that he lost his hand by a shot from one of the guns of his own troops. The fact is well known that at Wagram the two divisions of Bernadotte's corps fought with each other for some time, though in this case, the mistake was due to the different uniforms, one of the divisions being Saxon and the other French.

Yet mistakes of this kind were extremely rare before the introduction of

rifled pieces. They are on the contrary, much more likely to occur at the present time on account of the great distance at which fire is opened, and the greater the distance, the more care must be taken to guard against them.

Nothing so quickly demoralizes troops as to receive a fire in the rear from their own friends while they are fighting the enemy in front.

In two different battles the thing has happened to me. My men certainly did not think of flight, but it threatened to produce that sort of resignation which paralyzes all activity and takes possession of a man when he has the feeling that the end has come. At one time I even heard one of my captains give the command "Fire to the rear," and he was going to return the fire. You can easily figure to yourself what almost inextricable confusion would have followed if his order had been executed, but fortunately I heard it and prevented its execution.

The impression produced in such a case is certainly greatest if it be the attacking infantry which is fired into. The close combat with the enemy's infantry is in progress—is most violent. Perhaps it is the last phase of an attack upon a village. Suddenly its own artillery covers it from behind with a hail of the destructive shrapnel and then a catastrophe will seem to be inevitable.

Post yourself again, I pray you, in open field upon some point which seems to you suitable for an artillery position, and suppose that at 2200, perhaps 2700 yards, an infantry combat is in progress, the struggle fluctuating to and fro as the parties dispute the possession of a village or forest, and ask yourself if you could always tell with certainty whether this or that column of infantry which you see appear upon the field—this or that swarm of skirmishers crossing the terrain—belong to your army or to the enemy. Would you dare, if you were in command of the artillery to open upon them with shell or shrapnel? Consider also that you have to take into account the natural dispersion of the projectiles, and the more or less rapid burning of the fuses, some of which will have been of defective construction. Remember also that some projectiles deviate considerably from the normal trajectory, deviations too considerable to be due to the piece, and which are generally attributed to faults committed in the service of the piece (in pointing), but which will always occur (we call these wandering projectiles "deserters"), and then, mindful of the disastrous consequences these might produce, you will prefer not to fire at all. All the artillery, must then remain inactive (we suppose that it has wholly silenced the enemy's artillery) while the infantry engages in the final struggle, instead of causing the balance to weigh in its favor by opening upon the enemy a destructive shrapnel fire.

To avoid repetition I recall to your memory what I have said in my "Letters upon Infantry" concerning the part the artillery should take in the attack by other arms executed in open field. I proved then that artillery is not in danger of being destroyed by reason of coming within the effective range of infantry fire after this infantry is held in check by our own.

It would undoubtedly be folly to advance with the artillery to within 600 or 800 yards of a position occupied by infantry (a village or forest)

while this position is not yet under the fire of our infantry nearer to it. But at distances beyond 1100 yards infantry fire is no longer destructive, and it will be even less effective if the enemy be held in check by our infantry at 500 yards.

During the war of 1870-71 the French infantry was armed with a rifle which has not been very greatly improved in range and precision since that time, and nevertheless Dresky with his horse artillery could, at a distance of 1600 paces (1300 yards) at Flavigny, cross the bridge of Tantelainville with the loss of but one disabled piece, which soon rejoined him. I, also, have been able to hold with my artillery line of 54 pieces, from two o'clock till half-past five, August 18th, although a very numerous line of skirmishers was lying in the ground 1000 paces from our front which fired upon us incessantly. Furthermore, when the infantry combat was most intense, our batteries did not hesitate to approach still nearer and, side by side with the infantry, to take part in the fight, certain of them even in the firing line. Those batteries also were not destroyed which went forward under the heaviest fire of the enemy's skirmishers to the assault of the Geissbergs at Weissenberg; and at Wörth in advancing to Elsasshausen.

In these cases the artillery suffered losses. There can be no victory without them. But, as I have already said, the men in the batteries are not so near to each other as in a close line of skirmishers, and hence are in less danger of loss. Then, too, is a cannoneer more precious than a foot soldier? Are not both combatants in one and the same army? Does it not cost as much time and trouble to instruct the foot-soldier as the artilleryman?

Once I saw at the grand manœuvres a line of artillery which remained in position 2700 yards from the enemy at the moment when the infantry advanced to the close combat, because the next position in advance, distant 1100 yards from the enemy and separated from the one it occupied by a deep valley, seemed to be too near the enemy's sharpshooters. This line held itself there, far to the rear and wholly inactive, and even when the infantry reserves went into action and were consequently but 500 yards from the enemy, this artillery was 2200 yards from them in rear and had the appearance of having nothing to do with the corps at all. The defender profited by this inaction. Two of his squadrons advanced rapidly and with much skill, covered as they were by forests and ravines; and, turning the wings of this artillery, surprised it, attacked it in rear, and captured it.

Then the question occurred to me: What should the general commanding do when his artillery is obliged to remain so far to the rear? Should he perhaps leave with it two battalions as escort and thereby diminish the vigor of his attack in order to protect the artillery whose assistance he is about to lose? How, besides, if this artillery remain posted 2200 yards in rear, can he borrow a few pieces at the critical moment to overcome in the street fight, at any cost, the obstacles met with there, as was done at Weissenburg and at Bazeilles? How, if it be posted at this distance, can the artillery rapidly and at the opportune moment reach the captured position in order to insure its possession and to crush the enemy's reserves when they attempt the counter attack? It was clear to me that, even if it be

only for its own proper security, artillery cannot remain behind more than a few hundred yards from the battle line. But if it be desired that it sustain the infantry line vigorously and come in the opportune moment to render secure the success obtained by it, the artillery, whether it be an entire line, or only a part of it, depending upon circumstances, should hold itself but a few hundred yards behind the advancing lines. Circumstances might even occur when it would be proper for it to be with the most advanced of the firing lines.

The arguments which I have thus far advanced to prove that artillery cannot always be permitted to avoid infantry effective fire are those which, upon cool reflection, we find to be established upon tactical requirements; but the chief argument, the one I reserve for the last, I find in the depths of the human heart.

How is it possible for the artilleryman to see his comrade, the infantry soldier, engaged in the final struggle without going to his assistance? Shall he play the rôle of spectator so as not to "expose himself" at the moment when the lot of the battle is being decided—when the struggle is most fierce—this struggle which will cost the lives of double the number of foot-soldiers if the artillery refrains from taking part—of not half so many if it does act: this struggle which, without the assistance of the artillery could end in defeat, but with its assistance in victory?

Announce the rule that artillery shall hereafter avoid infantry fire. Perhaps you will find here and there some heartless individuals who will obey it and will consider themselves "covered" by the new regulation; but whoever is not utterly heartless will disdain your rule at the critical moment. He will advance to the assistance of those who fight, without consulting the regulations.

When at St. Privat we saw to our great surprise (for I had received the order to engage only in a slow cannonade) our infantry emerge from cover and advance to the attack, and when in advancing it masked our fire upon the village, we could not remain inactive in our position a single instant. I was at that moment between the corps artillery and the artillery of the 1st Division of the Guard and was conversing with their commandants. Seeing that our fire was about to be masked we all three exclaimed at the same moment, "We must advance also." I gave the order to these two commandants to advance their batteries as fast as they became masked. Many amongst them had limbered-up on their own responsibility and were prepared to move forward before the order reached them, amongst others Prittwitz's Battery, of the divisional artillery, which moved at a gallop and ascended the slope. It certainly suffered loss. It reached the crest with but three pieces, but with its first shot it was evident that the enemy's reserves no longer advanced boldly. It is true that Generals von Pape and Budritzky sent aides-de-camp to demand that the artillery support their advance, but these aides met the batteries as they were already in movement.

What might have been the issue of the conflict if the Artillery of the Guard and of the XII. Corps had wished to avoid effective infantry fire?

One of the greatest military authorities of the present time said one day

in making the criticisms after the grand manœuvres in which the artillery in the attack had avoided exposing itself to infantry projectiles: "This does not help matters. The artillery may shoot ever so far and ever so well, but finally it will have to go in with the rest." This is the desire of all manly hearts. Cold reason prescribes in vain that the artillery remain in rear at the decisive moment; the heart carries it to the front. The soldier should follow the dictates of his reason *and* of his heart. The artillery which advances directly upon an intact position filled with infantry until within a few hundred yards, with courage but without discretion, will be annihilated. The artillery which leaves its infantry in the lurch in order to evade the fire of foot-soldiers, will show that it has a great regard for its own interest, but it will prove itself heartless. It will be good for nothing.

So far I have treated only of the manner in which the artillery should act while in the offensive. The measures it would take when upon the defensive can be deduced from those established for the offensive. Theoretically they will be very easy to follow, but in practice the contrary is true.

I do not argue in detail in favor of my opinion that upon the defensive we may often be able to open fire at very great distances and that successfully. This is shown in the example drawn from the battle-field of Königgrätz where the artillery of the defendant at Lipa constrains the assailant at Dub, at a distance of 550 yards, to quit the highway with his marching columns and to seek cover where he can take the formation for the attack. The defender will commit a gross error if he allows the opportunity to escape him of cannonading the assailant with fifty per centum of hits, when he can thereby inflict loss upon him and embarrass his advance, and thus effect one of the principal objects of the defense.

But when the question arises whether or not the artillery should avoid infantry fire, the situation of the troops upon the defensive might be looked upon very differently from that of the troops who have taken the offensive, and we could reason that artillery upon the defensive should under no circumstances be exposed to infantry fire, because the horses would be killed, which would render it incapable of moving, so that if the assailant continue to gain ground it will inevitably be lost.

In occupying defensive positions I would advise to post the most advanced lines of skirmishers, whenever it be possible, some little in advance of the artillery lines, so that the latter may not suffer too much loss before the prelude to the skirmish fight. But I think an interval of 550 yards will suffice, for these skirmish lines will hold the enemy's infantry at a distance of at least 550 yards, and at 1100 yards this infantry can do no great harm to our artillery if it be kept fully employed by our skirmishers. Should the artillery be obliged to fire over the heads of its own skirmishers, this distance of 550 yards appears to me to be the minimum. Not because the artillery would be exposed to infantry fire, but because its own infantry would be in danger from pieces of the shell or shrapnel which might burst in the guns. Consequently 550 yards will constitute the normal distance at which, if upon the defensive, the infantry should advance beyond the artillery.

This distance will of course vary considerably with the configuration

of the ground. It could happen that in front of a height which makes an excellent artillery position there exists a slight undulation of the ground upon which is a building having the character of a fort (as, for example, the Chateau of Villetanneuse before St. Denis) which should be occupied by infantry even if 1100 yards in advance of the artillery. On the other hand the skirmishers may be able to advance but two or three hundred yards if proper localities in which to post them (farms, thickets, etc.) extend only so far, beyond them being the open field. I can easily imagine to myself a defensive position in which the points defended by the foremost lines of skirmishers are upon the line occupied by the artillery.

All this depends upon the terrain; but if I am free to choose, as, for example, in the case in which I throw up shelter trenches upon an open field sloping downward toward the assailant, I would place them, as I have said, 550 yards in advance of the artillery.

From all this it follows, therefore, that the artillery upon the defensive cannot always and everywhere evade the effective fire of infantry.

Even if the skirmishers posted at a distance of 550 yards keep the assailants fully engaged, some few of the projectiles will, nevertheless, either as scattering shots or fired intentionally, reach the artillery at 1100 yards, even at 1800 yards.

Again; it will be necessary to determine whether the artillery upon the defensive should stand fast in case the assailants' infantry drives in the defender's skirmishers and comes so near to the artillery as to menace it greatly.

To decide this question I will begin by consulting the infantry regulations and this is what we find upon page 148: "Therefore, in the greater number of cases but a minimum advantage is found in occupying advanced points with the intention of defending them but slightly. Ordinarily it will be preferable to cause the forces destined for the defense of a position to act, if not simultaneously, yet at least upon a single and the same line."

According to this passage the regulation condemns the method which consists in pushing light troops to the front who are expected to retire if the enemy makes a serious attack, and therefore it will usually be the case that the infantry posted in front of the artillery will be in the position in which it is to fight the chief combat. If it retires and abandons this line it will be because it is driven back by a superior force of the enemy after a long and bloody conflict, at least for our infantry, during which the artillery of the defender will have lost, either by shell and shrapnel or by infantry projectiles reaching it from the infantry fight, so many horses that we cannot in general count with certainty upon its ability to change position with rapidity. Yet it must do this rapidly on account of the compromising vicinity of the enemy.

But the most important matter to be considered is the disastrous effect which the withdrawal of the batteries at this moment would have upon the morale of the troops. The last reserves of the infantry will have been engaged (this must be, for the regulations require that the whole disposable force be brought into action in defending the position) and when it is forced to retire before an enemy superior in numbers, its units will have

lost almost all cohesion, because they will have lost a great number of officers and men. If the artillery retire with it, then that which might prove to be but the momentary check of the infantry will be transformed into a defeat.

Even if we succeed in moving the guns the fire of the enemy's infantry will kill, at this moment especially, a considerable number of the horses of the retreating pieces, and the greater number of them, being without defense, will fall into the hands of the enemy: and all this because there is no longer a line of artillery there which, by its fire, will enable the infantry to rally, to re-establish its lines, and to prepare to engage anew in the fight.

What would have been the result at Vionville if the grand line of artillery, which was established upon the front occupied at first by von Dresky's corps artillery, had withdrawn in order to escape from the enemy's infantry fire, instead of furnishing as it did to the infantry, closely pressed by an enemy two or three times superior in number, a point of support and shelter behind which it could re-form and return to the front?

Would the battle of Baune-la-Rolande have been a victory for us if the artillery had withdrawn before infantry fire?

The nearer this infantry comes to the artillery the more surely it is reached by its projectiles. The shells and their fragments will ravage its ranks; the shrapnel will destroy it, and even if the enemy advances to the muzzles of the guns their fire will repulse it at the last moment.

Wherein is the disadvantage then in having the artillery reduced to immobility by reason of having lost many horses? At this moment it should not manœuvre. It has but to fight, but to drive back the enemy by its fire and to maintain itself in position.

As General von Dresky so justly says in his letter already cited, it is not possible to force a line of artillery by a front attack, and it takes the place of a reserve destined to gather together the retreating troops.

When, therefore, it is upon the defensive, the artillery has even fewer reasons for evading infantry fire than when it takes the offensive. It will not, above all, endeavor to escape from it when its own infantry is driven back.

The reasons which plead in favor of my opinion have only gained in importance with the improvement in our pieces since the last war, for, with the shrapnel and shells of recent construction, the artillery can be more certain even than in the past that from the front it is impossible to break its line.

You will tell me perhaps that I enunciate in this a principle known to all and which no one disputes. But recently I find in pamphlets and articles emanating from well-known authors, and which I agree with upon all other points, that in many places they propose evolutions and changes of position to the rear for the artillery even when it is upon the defensive. Hence I fear that the long period of peace might lead us, by deductions too finely drawn, to become artificial, and through manœuvres and artificial evolutions to forget that which is simple,—that which leads straight to the mark,—and to place in the background the chief thing,—the impression exercised upon the morale of the troops.

One of the best of the recent works, entitled "Upon the Management of Artillery at the Manœuvres and in Action" (Hanover, 1883), demonstrates in an irrefutable manner the great importance of the regulation of the fire. The more the importance of the regulation of the fire has increased, the more stable the artillery has become. It can produce no effect while in evolution, and after completing the movements, again loses time, because it must regulate its fire anew.

One of the weaknesses of the assailant consists in his being obliged to make evolutions, that is to say, to go from one position to another. The defender should then profit by this weakness and make the best use of the strength derived from his immobility.

It is not asserted that the artillery of the defender should never interrupt the artillery duel for a certain time when the assailant is getting the upper hand; that it should never husband its fire, either in order to leave the enemy's advancing batteries to do the firing at long distances while it reserves itself for a more effective fire at shorter ranges, or to take part in the decisive infantry combat. But for this purpose it will suffice ordinarily to move the pieces a few paces to the rear of the height on which they are posted, and for that it is not necessary to make evolutions. At great distances it will even suffice simply to cease firing.

When, at Sedan, I caused the firing of one of my lines to cease in order to control the pointing as I moved from one piece to the other, the enemy very soon ceased his fire upon us. I believe he supposed that our pieces had abandoned their position. (Distance 2700 yards.)

You will object, perhaps, that the artillery cannot remain forever posted in no matter what defensive position, even if the commanding general decides to retreat. Certainly not. From the moment the retreat is ordered the artillery no longer controls its own action, and then we will do well not to expose it to effective infantry fire; for the general commanding cannot choose a worse time to order a retrograde movement than when his artillery is exposed to such a fire.

Even at the grand manœuvres a force composed of the different arms cannot effect its retreat as rapidly as a company whose captain has but to order "To the rear—march." It will be necessary to make a whole series of dispositions and to direct their execution.

In war the chief of such a corps, before causing his regiments to begin the retreat, should direct upon such and such a point his train, his baggage, his ambulances, and sometimes also his ammunition columns. If the artillery be menaced by an effective fire from the enemy's infantry before all these accessory services have been put in movement, then it will ordinarily be too late to execute the retreat in good order, and a disorderly retreat will result which will involve much loss. The pieces which have had horses killed after limbering-up will doubtless fall into the hands of the enemy even before the harness can be removed from the dead animals.

For this reason it is requisite to decide upon the retreat before the enemy's attack shall have advanced so far that a bloody infantry combat takes place, or, at any rate, after this first attack is repulsed and during the

time the assailant employs in taking measures for another assault. (See the details I give upon this subject in my tenth letter.)

In this case certainly the chief will begin by causing his artillery to withdraw to a new position whence it will embarrass the advance of the enemy and where, by opening its fire, it will indicate to the other troops the place where they should rally.

But there are exceptions to this rule also, as, for example, when the enemy has not yet begun the attack and the artillery of the defender commands a defile through which the assailant must pass and which he will not be able to pass while the artillery remains in position. In this case and in similar ones, the artillery, protected by cavalry, will be left the last in face of the enemy, until all other troops, the train as well, shall have gained such an advance that the enemy cannot reach them on that day. But the artillery must not be left in its position until it is threatened too nearly by the fire of the enemy's infantry. In this case and in others of the same kind we could sometimes gain time by cannonading the pursuing enemy vigorously with the artillery of the rear guard, which should for this purpose be re-inforced in certain cases by even the whole of the artillery of the corps.

INFLUENCE OF NEW INVENTIONS ON MODERN WAR.

Translated from the Russian,

By CAPTAIN C. M. MAGUIRE, 2D LANCERS, HYDERABAD CONTINGENT.

(Reprinted from Journal of the United Service Institution of India.)

THE military world had hardly succeeded in accustoming itself to the new magazine rifle and the powerful effect of the shells charged with the new explosives, the significance to be attached to high angle fire which will now be present on the battle-field had hardly been recognized, when the appearance of a new factor in the military problem, a smokeless and to a great extent noiseless powder, created a sensation in no way inferior to that produced by the other inventions referred to. The incessant improvements which take place in the appliances of war must, by their gradual increase, render the conditions of future campaigns very different from those which governed that of 1870-71 or even that of 1877-78. In considering the inventions and improvements in offensive arms, it is impossible to overlook the peculiarity they all share, viz., their conspicuous simplicity of design, ease of execution, and convenience of application. The calibre of a rifle is changed, a magazine fitted on, and the improvement is complete. A mortar is placed on a wheeled carriage instead of a stand, and high angle fire is at the disposal of field troops. A shell is charged with pyroxaline or melanite instead of powder, a sensitive percussion fuse is attached to it, and the mighty thickness of the plate of an armoured turret does not protect its guns and mechanism from the action of the subtle shell mines, nor those serving the guns from the poisonous re-

sults of their explosion. Finally the composition of gun and rifle powder is so changed that their discharge is accompanied by little noise and hardly any smoke.

These improvements in offensive weapons, while exercising a great influence on the different branches of the domain of war, do so especially on tactical tenets, and on the means of combating the new armament proposed by engineering art.

A report as to the adoption of a new invention which appears in the newspapers excites the whole military world, and may constitute a theme of more than ephemeral interest, remaining for years a subject of which the pros and cons will be discussed by the press, until the experience of actual war places it beyond the sphere of theoretical discussion. It is an advantage that in our days the political relations of states to one another are such, that from fifteen to twenty years of peace are available for a complete preparation for war, and for estimating accurately the characteristics of any important new military invention and its consequences.

As far as we soldiers (who are not specialists in the art of manufacturing powder) are concerned, the nature and composition of the new powder is immaterial. We are, however, concerned to know whether it actually gives no smoke at all or only a little, and also how far the report of guns or rifles firing it is audible or inaudible; as a scarcely perceptible smoke and an almost inaudible report render the eyes and ears at some distance off incapable of determining the enemy's whereabouts. Finally, it is necessary to consider whether the use of the existing examples of the new powder, though not perfectly void of smoke and sound, will serve for the mutual annihilation of two opposing forces, as no doubt the manifest advantages of the new powder will in time lead to the appearance of a perfectly smokeless and noiseless form of it. We should therefore take advantage of the present period of peace to study the consequences which will result from the introduction of the new powder. These promise even now to be so numerous that, though the subject has received considerable attention from the press, there are still some points with reference to it that have not been touched on, which may be of general interest.

Any new military invention only confers the greatest possible benefits on one of two opposing forces, when the other has not succeeded in adopting it. Consequently in a war with barbarous nations who are unable to obtain the appliances or adopt the organization of the armies of civilized nations in due time, the latter always prevail. This would in all probability also be the case in a war between two European powers in which one was armed with magazine rifles, field mortars, smokeless powder, shells charged with the new explosives, field watch towers, balloons, etc., while the other commenced the campaign under the conditions which would have been regarded as normal ten years ago.

But however destructive and terrible in its proposed effects any such modern invention may be, it loses much of its significance when it is at the disposal of both the contending parties. Consequently, the best means for opposing, or, more accurately speaking, of paralyzing, those advantages which the possession of a new invention confers on one side, will be its

adoption by the other. If the enemy is armed with long ranging accurate rifles taking small charges; if mortars form part of his field artillery; if he fires smokeless and noiseless powders, and carries out his observations from balloons, it is certainly necessary to have the same appliances or if possible better ones to oppose to him.

It has always been recognized that one of the principal means of getting on even terms with an enemy is to fight him with his own weapons. But contending with the enemy on even terms would not in itself be sufficient to confer the probability of victory to one side. It is further necessary to investigate thoroughly the best means of taking advantage of the improvements referred to, and thus anticipating or preventing the enemy from obtaining the same results.

Each invention in the Art of War has its advantages and drawbacks. It is necessary to take advantage of the latter in order to create an obstacle for the opponent, so that they may be more especially unfavorable to him, and thus turn them to our benefit.

Regarded from this point of view smokeless and noiseless powder does not appear to be an exception to the other new inventions, and therefore it cannot be as dangerous as it was at first represented to be; and though the position of a soldier of the last century armed with a musket, opposed to a soldier of our own times armed with a small calibre magazine rifle, would be unenviable, yet in the next European war, when both sides commence with the same smokeless powder, it will have little influence on the chances of victory for either side. These chances will, just as before, depend upon the entirely different causes which led to the victories of Hannibal, Alexander, Julius Cæsar, Frederick, Napoleon, and other famous leaders, whose armies fought with weapons that appear ridiculous in their inferiority when compared with the present ones, notwithstanding which the leaders who have been mentioned are even now our great instructors in the Art of War.

Thus we shall assume that both contending parties will make use of the new powder. Let us now consider the advantages and defects of the new ammunition from the tactical and technical points of view, both for field and fortress warfare, and the measures by which we may reduce its drawbacks, and make the fullest use of its advantages.

Every technical improvement in the Art of War is intended to further the following ends.

1st. The provision of complete means for defeating the enemy.

2d. To render it difficult for the enemy to make a successful use of the invention.

The new powder enables a more complete defeat to be inflicted on an opponent as:

1. In artillery fire, especially from a mass of guns, smoke will no longer overspread a battery and interfere with its aim; hence the fire will become more rapid and more accurate.

2. Owing to the same reasons, the flanking batteries for the defense of the ditches of permanent fortresses will have full view in the ditches, in which at present gunpowder smoke so easily accumulates and remains,

especially in the neighborhood of flanking buildings, behind the counterscarp wall, and in the sallyports. This great defect in the existing dispositions for fortress defense may now be regarded as obviated.

3. In rapid artillery fire or salvoes the noise of the discharge has hitherto drowned the voice of the commander and prevented a quiet direction of the fire, and the execution of orders without an intermediary. This inconvenience will not exist with noiseless powder.

4. Ordinary powder smoke, even in the case of fire from an open battery, irritates the eyes, throat and nose, with its viscous clouds, and in the case of fire from casemates renders a sojourn in them extremely disagreeable, necessitating the use of the well-known appliances for a vigorous ventilation of the casemates, which are insufficient during a rapid fire. In this respect the new powder effects a great improvement in the situation of an artillery soldier serving his gun. It also renders it possible to simplify the construction of casemates, as ventilation will no longer be necessary. Thus there will be one less opening in the casemate, which will increase its durability and cause it to offer a greater resistance to bombardment.

5. In the case of infantry the introduction of the new powder is accompanied by the same favorable conditions for fire as were pointed out in the preceding paragraphs. It is only necessary to add that, in the defenses of fortifications, the series of volleys discharged during the last moments of a storm are accompanied by such clouds of smoke, that the assailant's movements are completely concealed from the defenders.*

As this smoke will no longer be present the new powder favors the defensive.

The appearance of smokeless powder could not have been more opportune than in these days of machine and quick-firing small-arms.

6. If an enemy's battery in action, or in a firing line, is the target of our battery, the smoke covering them protects them from destruction, as it conceals the place where the shells fall from observation (even from balloons), and thus increases the difficulty of aiming. When the new powder is used, the targets will not be masked by smoke, so they will be more easily destroyed.

Such are the direct advantages attendant on the use of smokeless and noiseless powder, but the following indirect advantages consequent on its use should cause great difficulty to an opponent, and thus add fresh advantages to one side.

1. A battery or firing line in action usually betrays its presence by the noise and smoke caused by its action, which enables an enemy not only to estimate the number of guns, the strength of the firing line, and the extent of the position occupied by them, but affords also very reliable data upon which to determine the whereabouts of the battery or firing detachment, which facilitates taking the range and selecting the target. In fact powder smoke favors the observation of the enemy in general, and fire in

* *The Revue du cercle Militaire* in an article on "The employment of artificial clouds in war" considers in detail the means for producing artificial clouds of smoke from various combustible materials, and demonstrates the value of such masses to an assailant who cannot have recourse to other cover.

particular. Consequently, when firing the new powder, our batteries and personnel, will themselves suffer less than heretofore from the enemy's fire, and the general dispositions for a battle will be better concealed.

2. The batteries or firing line of the enemy can make use of their smoke as a mask to enable them to change their original positions, moving forty or fifty yards backwards or forwards or to one side, thus compelling a fresh aim to be taken at them without however losing the range they have themselves found. If the enemy fires smokeless powder he loses this advantage, and as all such changes of position would take place openly, they would have no *raison d'être*.

The advantages of the new powder pointed out in the first paragraph have an especial significance both in field and fortress warfare, particularly in the artillery duel. With reference to the possibility of seeing the target. In order to direct an efficient artillery or small-arm fire on an enemy, it is indispensable to see the target or at least to observe the results of the fire. It is true that the bombardment of an unseen object attended by certain favorable conditions, has become the usual task of the present improved artillery, but when mention is made of an unseen object it is not always added "unseen from the battery, but visible from some other point situated more or less near the battery." Meanwhile the matter stands thus, that the target must be seen from some point, as, if not, it can only be hit by firing by plan, or in other words, at random.

Major-General Kirpicheff, writing on the subject of breaching escarp walls (an unseen object), points out that it is necessary to go up close in order to observe. It is possible to bombard from a distance, but one must be near to observe. The Bavarian General Zueor has expressed his conviction that, in dealing with long-ranging weapons, the principal object to be fulfilled is to see without being seen.

But if it is impossible to find a point from whence to view the target, not only owing to local conditions, but on account of deficiency of time, which is not always at our disposal, especially during active operations, how are the whereabouts of the target to be ascertained, and the enemy's guns in action silenced? The only means the artillerist has for this purpose is that the intersection from two different stations of the clouds of smoke which appear above the enemy's position will approximately define the distance to the gun, and its distance from the covering body, or mask. Powder smoke has thus often proved only a fictitious mask, as it is impossible to prevent its rising, while its concealment is only practicable among very high trees. As a gun firing the new powder does not betray its presence by smoke, the artillerist is deprived of his last resource for determining the position of the target.

The importance of screening artillery in war is recognized, especially when it makes use of the screen to change its position unperceived, and thus disturbs the enemy's aim by constantly avoiding the zone fired on by his artillery.

There is no doubt but that smokeless powder affords the best screen to guns, as at considerable distances neither smoke nor guns are visible.

But the conditions as set forth above as governing the relation of the

new powder to the field and fortress warfare of the future do not exhaust its influence, which enters into the very secret corners of battle tactics, both in relation to the direction of the fire and the leading of the troops. Its influence also extends to outpost service, reconnaissances, ambuscades, and forlorn hopes.

We shall first consider briefly the special peculiarities of outpost services, which appear most striking in connection with the use of the new powder. Cavalry or infantry pickets usually stand some five or six hundred paces apart. The distance of the support from the line of pickets is as much as 1000 paces, while the main body is about 1000 paces in rear of the support. The rules for outpost service lay down signals for the transmission of information from picket to picket and to the supports, but in important cases they recommend that a volley should be fired, which would certainly raise a simultaneous alarm along the whole line. It is true that a volley should only be fired in "case of extremity," notwithstanding that sentries often fire on the slightest suspicion of danger and raise false alarms. When a noiseless or nearly noiseless powder is used, such alarm will become rarer and in no case will they be general. But this advantage will be counterbalanced by the fact that the position of the pickets when the new powder is used will become very difficult. Their vigilance must be strained to the utmost, as the enemy will not betray his presence when he shoots.

A sentry may be killed by an enemy's bullet, of which his comrade will probably only hear the whistle. There will be no indication as to who fired the bullet and whence it came. In such a case the morale of the picket will suffer, men will be more nervous when on duty, and consequently there will be more frequent false alarms. But the whistling of bullets increases, alarm spreads from the supports to the reserves, and the latter hasten to the rescue, but it is impossible to determine the strength of the enemy or the precise direction of his advance. Besides, the hanging musketry fire is not audible on the position, and the necessary measures are not taken by the main body until the arrival of a messenger from the reserve of the outpost. In such circumstances it would be easy to be taken by surprise. However calm and collected a picket sentry might be, on hearing the whistle of a bullet, he might consider it as coming either from one side or behind, imagine an ambuscade or turning movement, and fall back on his picket, unnecessarily abandoning his post. In short, the mysterious aspect of noiseless war and an invisible enemy cannot but have a prejudicial effect on the efficiency of sentries, and must increase the difficulty of precautionary service, which is even now considered particularly severe, and demands large forces, as the use of the new powder will necessitate the devotion of a much larger force than heretofore to the preservation of safety.

As far as minor operations, including ambushes and forlorn hopes, are concerned, if it be considered that a great part of their success depends on concealment and the preservation of perfect silence, the new powder must be recognized as especially favorable to such operations.

What then will become of the much talked of movement when the vol-

lies commence? With the new powder nothing except hoarse cries of hurrah, the clash of arms, the tramping of horses, and clouds of dust will betray the scene of the battle; while there will be no means of following the course of the engagement which has hitherto been apparent from the greater or less density of the smoke, while the thunder of the guns and the rattle of the musketry has been heard for miles. With reference to this last point, it is interesting to follow the different phases of the action at Schipka, Sheynoff, and Imetti on the famous 26th, 27th and 28th of December, 1877, episodes so graphically described in General Kouropatkin's article "General Skobelev's detachment's passage of the Balkans."

General Skobelev could not obtain early information of what was going on in Prince Mirski's column, and *vice versa*. On the 27th the left column had a severe engagement with the enemy at Sheynoff, while Prince Mirski knew nothing definite as to the movements of the right column. "At about 11 A.M. on December 28th intelligence was received that Skobelev was near, but even without this late intelligence" writes General Kouropatkin "the approach of our troops from the Imetti direction would have been known from the increasing roar of gun and rifle fire resounding on the western side of the camp. Although we could not see the troops of the right column we knew that it was fighting hard."

According to Colonel Raaben (the chief of the staff of the right column), at the time of the general attack by Prince Mirski's troops on the Sheynoff position, on December 28th, the Turkish fire grew weaker, and then to the general surprise altogether ceased. It was impossible to make out through the smoke mingled with the haze of a cloudy day what was taking place at a distance, and the troops moved forward without knowing what had taken place, and both sides sustained severe losses before it was ascertained that the Turks had surrendered.

This too will serve as an example. During the action at Sheynoff five battalions occupied Kazanlik, three of which were ordered to move on the village of Goozovo. "They had not emerged from the town, when they heard musketry fire, and a doubt arose as to whether a corps of 10,000 men had not come to the rescue of the Turks. Kolomentsi was abandoned until the circumstance was explained. It was subsequently ascertained that the fire was that of a few Bashibazouks, yet it caused the whole column, moving to occupy the important position at Goozovo, to halt.

During the action at Sheynoff General Radetski's troops in the valley occupying the Schipka Pass were in great difficulties. The general received a dispatch from Prince Mirski which concluded with the following words "You must send me ammunition and food." Meanwhile at night and during the twilight the moving lines of musketry fire rendered it evident that Prince Mirski was engaged. From daybreak the locality was covered by a dense fog. This fog prevented General Radetski's troops from seeing the approach of General Skobelev's detachment to Sheynoff, while a high wind which had risen prevented them from hearing the cannonade from the valley. Between 10.30 A. M. and 12 A. M., it was reported from an observing post on St. Nicholas that occasional

vollies and the fire of single guns were audible to the west of Schipka village. East of that an occasional musketry fire was audible. These observations were incorrect, as at that time the action in the valley had attained its greatest intensity, but the reason of this was that the wind whistled in the rocks and drowned the report of the fire. Were the powder nearly noiseless, wind would not be necessary to render the fire inaudible at such a distance, as that from Sheynoff to Mount St. Nicholas.

"In the meantime," writes General Kouropatkin, "if the cloud had risen for an instant, and the orderly advance of the Imetti detachment could have been clearly seen from Mount St. Nicholas (or had the wind fallen and the sound of the fire become audible), General Radetski, assured as to the success of the engagement, could have deferred his action, as there was no necessity for re-inforcing the right column, and the seventeen hundred heroes who fell in the fierce fight at Schipka, after the engagement had ceased lower down, might have continued to serve the Czar." But this it was impossible to ascertain, as nothing could be seen, and hardly anything heard.

Finally, and this is one of the finest passages in the narrative of the action at Sheynoff.

General Skobelev carefully followed the course of the engagement. The time approached when it would be necessary to bring the reserves into action. "How many have we in reserve?" "Where are the reserves?" "Are they not too far off?" These were the questions Count Keller had most often to answer. Knowing how his personal example acted on the advanced troops, he might himself have moved forward into the fighting line, but this would have been the equivalent of the expenditure of the main reserve before the arrival of the decisive moment of the attack.

Those moments must not be allowed to slip. Skobelev belonged to the number of born commanders who do not make a mistake on such occasions. He knew how to feel the pulse of the action, and accurately estimated the now ebbing, now convulsively vigorous beats of that pulse. What others did not understand was clear to him. In particular he perfectly understood the music of war, and could distinguish the notes and harmonies he required amid a thousand sounds. The intensity, uninterruptedness or intermittence of infantry fire, the direction and frequency of artillery fire, the movement of a line of smoke, the appearance of those who came out of action with dispatches, the substance of the dispatches, their form and appearance, the aspect of the wounded carried from the field, etc., etc., things which escape the notice of others, told Skobelev what he should decide. In this music of war Skobelev knew his key-note and guessed the approach of the moment when it was not only necessary to re-inforce the troops in the firing line, but also for him to accompany them into action. How many precious notes are included in this harmony! How much the music of war will be weakened, and the hues of its picture dimmed, when neither the roar of the fire nor its smoke continue to add their striking shade either to the music or the picture!

A Spartan king, who saw a catapult, then a novelty, among the jactile weapons of antiquity, exclaimed, "Alas, the end of warlike valor has

come!" Should it not be exclaimed now in anticipation of the introduction of smokeless and noiseless powder. "Alas, the music of war is silenced!"

The Spartan king was mistaken: not only catapults, but also 110 ton guns, explosive shells, and magazine rifles have been unable to deprive the soldiers using them of valor, and we may hope that if, thanks to the new powder, the music of war will be silenced, its picture will stand out more clearly.

If we lose one of our organs of sense, do not the others become more energetic? If the ear does not perform its functions, the eye has to be more alert. The manner in which this principle can be applied to war is pointed out by the development of contemporary artillery. At first direct and breaching fire were brought to perfection, but cover placed a limit to them, as an earthen bank even of inconsiderable height intercepts a shell fired direct; then artillery tried cross-fire, but cover increased in height, and now curved fire has attained perfection. The shell flies up and comes down on the target from above, passing over all the obstacles that were efficient against direct and cross-fire.

The new powder with its noiseless discharge will render it impossible to follow the music of war, and it will throw death-dealing shells and bullets from guns and rifles imperceptibly to the eye; thus it is much more difficult to follow the course of the engagement, and the enemy is protected from observation.

This can only be counteracted by seeking means to look at the field of battle from above it, which will be found an effectual antidote to this new military poison. The best possible system of observation must be opposed to the new powder, and the picture of the smokeless battle-field must be surveyed from a great height in order to view its entire extent.

Valor has not ceased to be the decisive factor in war, notwithstanding all the technical improvements that have taken place in the means of warfare, commencing with the catapult, and concluding with the magazine rifle. It has not lost its influence, because the result of a war does not depend upon those inventions which are at the disposal of both sides, but on the gallantry of the officers and soldiers, and the ability of their commanders. There is a modern invention to oppose to smokeless powder. Its advantages and drawbacks apply to both sides, so its use will not affect the influence of valor. It is incontestible that, as far as leaders are concerned, the introduction of smokeless powder will increase the difficulty of directing a fight. They are therefore more than ever before in need of information, as besides the talent necessary to follow the course of the engagement, the best leader now requires to see—see—see, in order to be able to direct it.

Thus the invention of smokeless powder has imparted a great significance to the direct view of the battle-field, and has rendered the organization of observing parties, and the preparation of appliances indispensable for both field and fortress warfare. Such observations can be carried out either from watch towers or balloons; the latter are either captive or free.

WATCH TOWERS.

All local objects, such as high trees, buildings, church towers, and artificial immovable towers erected on a spot on some other occasion, such as Cossack watch towers, must be classed as watch towers. Every elevated point that is favorably situated and commands an extensive view (*e. g.*, the steeples at Strasbourg and Metz in 1870, Mount St. Nicholas at Schipka, in 1877, and such like) may serve as an observing station. It must, however, be borne in mind that, in war observations have to be directed to a definite end, therefore the means made use of must fulfil certain conditions that are seldom to be found in local watch towers.

The first and most important of such conditions is the portability of the tower. It must necessarily be seen by the enemy, and once any such object is seen by him, the question of its destruction by artillery fire is one of time, and that probably a short one. A portable tower alone can remain intact and serve for a careful observation within gunshot of the enemy, as its position can be changed. A local immovable tower is not always situated in a good position, nor does it always command an extensive view, and finally, it is not always possible to observe from it those points on a field of battle it may be necessary to see at any given moment. Finally, the very mobility of field armies and the difficulty of foreseeing those places where a more or less decisive action will take place renders it necessary that watch towers should be able to accompany a field army, and that their mobility should not be less than that of gun carriages, the most mobile of field carriages. Just as a gun has to be able to come on a position, and occupy a given point, in spite of the difficulties of the ground, so it should be possible to bring a field watch tower to any point, whether on a road or not, even across hillocks, and stumps of trees, and down steep slopes, and they should require for their traction not more than six horses. Hence it follows that, whatever may be the place upon which field watch towers are constructed, their entire weight including the carriage should not exceed nineteen hundred weight, the weight of a field gun behind the teams.

The normal elevation which the watch tower can give to an observer is the second condition. The watch towers that have been constructed up to the present have been from 80 to 100 feet high. The height has been placed within these limits because it is not worth while to make one less than 80 feet high, while considerations of weight render it impossible to construct one more than 100 feet high. The watch towers adopted in foreign armies are 84 feet high.

The third condition is that the tower should be capable of being raised to any height lower than the maximum, which will often facilitate its concealment, as there is no reason why it should be raised to its full height, when a lower would be sufficient.

The fourth is an essential condition, that the tower should be simply constructed, and easily raised or lowered, either of which operations should not take more than ten to fifteen minutes, and it should not require an establishment of more than 8 or 10 men.

The fifth condition is, the stability of the mechanism, and that the tower should not be liable to damage, and be easily repaired.

The type of field watch tower we at present have does not fulfill these conditions. The lightest of them, that of Wildgroube, is complicated in construction, easily damaged, and requires a large attendant personnel, as it is very unstable when raised to its full height; while it cannot be adjusted to intermediate ones.

However, the fact that there are not field watch towers fulfilling the necessary conditions, does not prove that such could not be constructed. Art will certainly find the means for the purpose, and they must be found for a field watch tower, as an elevated and mobile observing station will undoubtedly be of use in active warfare; and the small height (maximum 100 feet), to which they can be raised, is always better than the ground level from which nothing can be seen, or a church tower which will be destroyed by the enemy's shells.

With the new powder and field mortars, mobile watch towers appear such a valuable and indispensable assistance, that it would be advisable to have not less than two of them to each infantry division (or still better, one to each regiment of infantry*). And one to each cavalry division.†

The principal and most insuperable defect of the watch tower is the relatively small height to which it elevates the observer, and consequently the relatively small horizon it gives him, while the conditions are not always favorable for observation; for from a watch tower 84 feet high points as near as 2000 yards are seen at an angle of depression of 1° , so that though the movements of masses of troops would be quite apparent, local obstacles could easily interfere with a careful observation of them.

A balloon is different. At a height of 1400 feet it gives at 2000 yards an angle of sight of 12° , at 3000 about 8° , at 5000 about 6° , and only at 24 miles does its angle descend to the level of that of the field watch tower.

The horizon of an observer from a balloon extends six miles, and with the aid of a telescope moving hostile masses can be discerned at from nine to twelve miles.

We shall here confine our attention to the conditions of observing from captive balloons‡ and shall see how far practical use can be made of such observations; to what extent they are reliable; and how they can best be carried out.

It has been proved by experiments carried out for both peaceful and warlike purposes, that observations from a balloon can be of great use and are perfectly reliable.

THE MILITARY USE OF BALLOONS.

On the 1st of June, 1862, in the action near Richmond, General McClellan made successful use of observations carried out from a captive balloon at a height of 1000 feet. The balloon was connected with the head-

* A Russian regiment consists of 4 battalions, a brigade in our service.

† There is hardly any doubt as to the value which field watch towers would have for cavalry for reconnoitring service and the transmission of signals. Our cavalry, especially the Cossacks, often made use of watch towers in the Turkish War of 1877-78, but only local or improvised ones.

‡ The consideration of the conditions which affect observations from free balloons has not been undertaken, as in the present state of aeronautic science a systematic employment of free balloons is out of the question.

quarters by telegraph, and McClellan received constant intelligence of the enemy's movements. He was thus enabled to concentrate two divisions, one of which had to be moved forward from behind the Chickahominy. The general was able, owing to the information supplied from the balloon, to form an accurate idea as to the course of the engagement throughout its vast extent, and select the proper moment for a decisive stroke, which was attended by complete success.

When we have mentioned the battle of Fleurus in 1794, in which the French success is directly attributable to observations from a balloon, we have exhausted the occasions on which balloons have hitherto earned the right to have their services considered on a par with the other factors that lead to victory. Though balloons have been subsequently used for tactical and technical purposes in France (Paris and Metz) in 1870-71, in Egypt in 1885, and in Tonquin in 1886, their use was not attended by such decisive results as those attained by McClellan, although the value of their services in these campaigns is generally admitted. The Germans have often expressed their regret that they did not make more use of balloons in the campaign of 1870. Thus, in the "Almanac for Sailing Vessels" of the year 1889, it says that, had the German army had balloons before Metz and Paris, it would have had timely notice of the most important measures taken by the enemy, *e. g.*, the retreat of the French Army of the Rhine, which commenced on the 13th August, and its passage across the Moselle for the sortie of the 31st August. Similarly in the siege of Paris, all the great sorties undertaken by the besieged might have been observed, and the requisite measures taken to prevent them, which would have saved the German army much unnecessary loss.

Can it be denied that, if the Russian army had had balloons from which the movements and actions of our troops as well as the camp of Plevna and the dispositions of Osman Pasha's reserves would have been as visible as though spread out on the palm of one's hand during the battle of the 30th, 31st August (11th and 12th September new style), it would have been spared the enormous losses which attended the storm? In this connection another circumstance requires note. According to the testimony of the Germans in the campaign of 1870-71, the appearance of a balloon in the air had a depressing effect on the troops and their leaders. It was very disheartening to see and feel that it was impossible to avoid the impertinent eye which followed them, from which the slightest movement could not be hidden, and before which skilfully planned secret operations lost their significance.

Though few examples of the employment of balloons in war are available, such as there are sufficiently clearly prove that an observing post supported by a balloon at an elevation of 1000 to 1800 feet above the surface of the ground is able to present the commander-in-chief with a picture of the action, and to facilitate the determination of the important point and the advent of the decisive moment of the engagement; besides which early notice can be given of turning movements or the arrival of re-inforcements for either side, rendering timely measures possible.

These examples do not, however, furnish a sufficient proof of the services which observation from a captive balloon may render from a technical

point of view, by which we mean observation of artillery fire to correct it, watching the course of works in the attack and defense of fortresses, and so forth.

In the blockade of Metz the tower of the city cathedral answered the purpose of a balloon for the defenders. The look-out stationed there incessantly guided the fire of the fortress guns by telegraph, and once the Germans were obliged to abandon one of their camps on which a fire was directed from information supplied from the cathedral tower, though until then the besiegers had considered the camp perfectly secure.

The peace practice in engineer schools and at manœuvres, which has taken place during the last six years in all the European States, is much richer in definite results. It has in the first place worked out the general character of aerial navigation, and determined the material requisite for the formation of field and fortress balloon parks, and the rules to be followed in making observations.

Without entering into the details of the organization of balloon parks and their composition, we wish to point out the objects of the service and the results that have been obtained by the experiments that have already been carried out, and to prove that by the use of balloons it will be possible to a great extent to eliminate the influence of smokeless powder on modern warfare. The experiments in the schools, and the practice at manœuvres of late years in France, England, and Germany, and at our manœuvres of 1886 and 1888 have determined the following conditions with reference to balloons as military observing stations.

1. At a height of from 1400 to 1700 feet the horizon extends to 54 miles or more, but at such a distance it is difficult to discover anything. Good observations can be carried out up to six or nine miles. It is possible to examine the country up to 15 or 18 miles, but only moving masses of troops are visible, and cavalry can only be distinguished from infantry by the use of a telescope.

At an elevation of 1000 feet troops can be easily perceived with the naked eye up to distance of five miles; columns of infantry, cavalry, or artillery can be distinguished from one another, and from their shape and extent it is possible to judge of their order and strength. It is only possible to use a binocular with a large field of view for distances below nine miles. The dust raised by troops on the march conceals them from view, but its thickness and extent render it possible to estimate the strength of the column.

2. From an elevation of 700 feet or more the general view of the action both as regards our own and the enemy's forces is very clear.

3. A hilly country can be observed from a balloon, but frequent villages, high brush-wood, and woods completely cover troops. In an intersected and wooded locality it is necessary to have the balloon at its maximum elevation of about 2100 feet, while in open spaces an elevation of from 500 to 700 feet is sufficient.

4. Intelligence can be communicated from a balloon through a speaking trumpet up to 600 feet, by notes in envelopes weighted with sand, by telegraph, and by telephone. The car should communicate by wire with

the station of the commander; writing letters and sending messages by orderlies disturbs the attention of the look-out party and wastes time. In the French manœuvres of 1886 news by telephone from a balloon arrived twenty minutes before it was communicated by cavalry.

5. Fog, the haze on a hot day, and smoke accumulated over the scene of a severe engagement interfere with balloon observation; the first altogether; the second only on the horizon; when there is a breeze, smoke only conceals the details of the action.

6. A high wind (up to nine yards a second) interferes with observations, as it shakes the balloon and may bring the car to the ground.

7. Manœuvres with a balloon are not prevented by a wind under seven yards a second. With a steam gyn the elevation of the balloon is accomplished in two or three minutes, the descent in five. The balloon can be moved at the rate of two and a half miles an hour along roads, and at the same rate by hand across country if there are no roads. With a wind of not more than from five to seven yards a second velocity, a balloon can move as fast as an infantry column.

These examples show that balloons afford reliable information upon which the commander of a force can base his dispositions. They also prove that this guidance, based on observation, can supply the place of the music of war for the direction of gun fire with the new powder.

Let us now consider the technical experiments carried out with captive balloons. This is the rôle of the balloon as the antagonist of smokeless powder. It has been remarked above that, in a well screened position, clouds of smoke alone serve for the more or less exact determination of the position of the target. Although foreign military writers have frequently stated that observations from balloons will render the correction of fire at concealed objects possible, this has not yet been practically proved. The only available guidance is that furnished by the practice carried out by our balloon park in 1888.

The following were the results of the practice:

1. From a balloon at an elevation of 1400 feet at a distance of 2000 yards the reconnaissance of fortified positions gave the following results. It was possible to determine the extent of the works; to distinguish works from batteries; to ascertain the plan of the works and whether the ditches were wet or dry; to calculate the number of traverses and barbettes; to determine the profile; to discern clearly the external construction of the fortifications, and even the damage they had sustained from artillery fire.

It is certain that it would be impossible to obtain such valuable results from any other reconnaissance of an enemy's position.

2. Fortifications and batteries can be concealed by brushwood even from observations from a balloon, unless its elevation is more than six hundred feet. At the greatest elevation of the balloon bushes no longer afford cover to the object; such great elevations, however, are only practicable when the car is connected by telephone with the battery in action against the object, as throwing down letters is too slow a means of communication and the speaking trumpet is inaudible.

An intersected locality and brushwood do not prevent the observation, from an elevation of five or six hundred feet, of an enemy's battery in action, which betrays itself by the report of the discharge and clouds of smoke. We may assume that in this case even high trees, woods, etc., do not screen the target, for though it is impossible to see smoke behind them from the ground level it is different when we ascend to a height. In any case high trees, avenues, and woods are the best mask for fortifications, and unless fire proceeds from them, it will be very difficult to determine their position, and, of course, even more so to ascertain the details of their construction even from a balloon at its full elevation, if it is more than two or three thousand yards from them.

3. Wind interferes with accuracy of observation, covering the target with smoke from our shells; and a fog completely conceals the target.

4. Observations made from a balloon at a distance of some 2000 yards are much more accurate than those from ordinary observing stations. It can be ascertained whether the shells fall to the right, or left, short, or over, while it is possible to determine from a balloon the exact part of the work into which the shell falls; whereas the observing post, judging by the color of the smoke on the burst of the shell, only signals "in the work." It is not yet possible to distinguish the exact amount "over" or "short;" however, it is to be anticipated that more practice, and training the observer in perspective, will render it possible.

5. The distance of the target from the balloon can be very accurately determined, as the position of both can be found on the map, and the intervening space measured. The conditions of field warfare seldom require fire at unseen objects, but in wars of position such as Metz, Plevna, and Schipka, the services of balloons will be indispensable, and they will be, if possible, more necessary for fortress warfare.

We shall now consider the characteristic features of fortress artillery warfare, assuming that smokeless powder and balloons are at the disposal of both belligerents.

THE ADVANTAGES OF THE ATTACK.

The dispersed nature of the targets offered to the enemy.

Their small profile, which only offers a small target to the enemy, and renders it easy to screen them in an intersected country.

THE DISADVANTAGES OF THE ATTACK.

The comparatively small mobility of its armament, owing to the absence of properly constructed roads.

The absence of local cover (groves, thickets, villages, etc.) in the neighborhood of the fortress, for the defender will take timely measures for its destruction.

The weakness of its artillery at the commencement of the struggle.

The necessity of having the parks, camps, and stores a long way (3 or 4 miles) from the fortress.

The necessity of bringing up from the base the requisite material for filling balloons.

THE ADVANTAGES OF THE DEFENSE.

It can disperse the objectives of the offensive in the intervals between the forts.

It can offer the same small profile.

It can cover them by local screens and artificial cover prepared beforehand.

Besides these:

The works of the fortress have a permanent character.

The artillery armament of the fortress, as well as all the means at the disposal of the defensive, is mobile; its mobility is increased by the presence of metalled roads and railways within the fortress rayon.

The neighborhood of the forts is cleared of natural cover, especially bushes and trees as the most dangerous.

The overwhelming strength of the artillery, which can be concentrated for a massed fire on the works of the attack under direction from a balloon, though these objectives are distant and covered.

The success of this sort of fire can be assured for the defense in the first place, by practice from the guns during peace; in the second, by the preparation of good plans of the fortress rayon at a scale of $1/100$; in the third, by the possibility of firing by plan, which facilitates the direction of the fire on an unseen object, the position of which is determined from the balloon.

In fortress warfare balloons do not afford the same assistance to the assailant in the bombardment of unseen objects as they do to the defender, as the position of an artificially masked target cannot be exactly determined without detailed maps; and were the position ascertained, the direction of siege guns on a target, especially its destruction by the concentrated fire of several batteries, would in the absence of maps be very difficult and would occasion a great loss of time. On the other hand the possession of plans renders it possible for the fortress artillery, immediately on receipt of intelligence from the balloon, to open fire on the target pointed out, as the plan enables each gun to be accurately directed on it; not only the direction, but the angle of elevation and the fuse being given. In order to show the efficiency of such a fire, it may be mentioned that, in France, where firing by plan has been adopted for fortress artillery, in experiments carried out at one of the fortresses on the eastern frontier, 120 fortress and field guns were able to take part in the bombardment of a point between five and nine thousand yards from the defensive position. The direction of the fire of all the guns on the point only took from ten minutes to a quarter of an hour, and after an hour's bombardment the neighborhood of the point fired on (a cross road) forming a square of 280 by 100 yards was torn up by shells, as though it had been ploughed. An observer in a balloon is the only person who can point out a target 5000 yards or more distant, and direct the sighting shots. But I repeat that, even though the assailant is able to do the same, his success and rapidity of execution will always be less than that of the defenders, owing to the want of peace practice with prepared maps. Thus it appears that smokeless powder is more favorable to the defensive than the offensive in fortress

warfare, as on the former side the balloon neutralizes the masking power of the new ammunition.

Besides, the defensive has more facilities for making use of balloons than the offensive, as an inexhaustible supply of the materials necessary for filling them can be collected in the fortress. A captive balloon can avoid destruction by being moved with its crane along and across the position, an advantage not possessed by the assailant, who owing to unfavorable local conditions will generally have to separate the balloon from the crane, moving it by hand even across telegraph wires, which are underground within the fortress rayon.

Hence it is evident that serious attention must be devoted to aeronautic service to improve both its materiel and personnel, especially the observers, who should, for tactical purposes, be selected members of the general staff, and for technical, artillery and engineer officers.

It is true that balloons will be of especial use in position and fortress warfare, but it is impossible to deny their value in every description of engagement, especially in reconnaissances. We have seen that in favorable weather they can keep up with infantry, therefore the minimum normal proportion to accompany field troops should be a balloon park for each army corps; each balloon park should include not less than four balloon cases, two ready for use and two in reserve, two steam cranes, and a hydrogen generator.

In the case of a fortress the more balloons there are the better. Their uses in a fortress are various. It is necessary to watch several points simultaneously in the fifteen or twenty miles of its periphery. The observation from some must be exclusively tactical, and from others confined to the successful direction of the fire on siege batteries and works, and the examination both general and detailed of the whole course of the attack.

The proposed establishment of balloons for field troops is a very moderate one, while their service is of such a nature as to render a larger number desirable, especially if we consider the inevitable losses both in balloons and appliances which must take place on service. But it is necessary to await the time when a better apparatus for generating hydrogen shall have been devised for field service. The principal inconvenience of the existing apparatus is the weight of the essential materials (sulphuric acid and water), and the time necessary for the collection and packing of the appliances for a march. Hence generators of the present type have to be placed from three to five miles in rear of a position, so that in case of retreat they may not fall into the enemy's hands. Filled balloons take up their position in action held by hand or attached to a crane, and have to return to the generator to be refilled. When the weather is favorable, especially when there is little wind, the balloon does not require to be refilled for three or four days, but if there is a strong wind, it may require fresh gas every day; hence the inconvenience of having to take it back to the generator, for if the troops advance during its absence the balloon cannot overtake them, and it may arrive at the scene of action too late. Hence the park must consist of not less than two filled balloons; then if both

lose their power, one can be refilled from the other, and remain with the troops, while the other returns to the generator.

Economy would be misplaced in the balloon establishment to accompany field armies, and more so in that for fortresses, as balloons are a valuable means of observation, capable of laying bare the position of the enemy and rendering nugatory most means of obtaining cover, including that of artillery and skirmishers. If we may so express it, the smokelessness of the new powder will only arrive at its maximum efficiency when the balloon is regarded at its proper worth, neither as a freak of contemporary inventive act, nor as an interesting accessory, but as a real military observing station which it can be made at any moment. Besides its value increases in proportion to its use, which should be incessant from the beginning to the end of war. This is only possible when there are a sufficient number of balloons present in an action for their information to supplement one another, and with a thoroughly competent technical and observing personnel. The important services which captive balloons will render to both the opposing forces will assuredly have the natural consequence that each side will endeavor as quickly and completely as possible to rid itself of an impertinent observer. Every means will be employed for the destruction of the adversary's balloons or the prevention of their use.

Three means are at present available for this purpose, viz., gun fire, rifle fire, and the capture of the balloon. We shall consider how far each of these means is effectual. Captive balloons are comparatively safe from small-arm fire but shrapnel is more dangerous,

Experiments in England and Germany have proved that shrapnel and splinters of common shell occasion such serious damage to the cover of the balloon, that, owing to the quick escape of gas, the rents become larger, and the balloon falls to the ground. However, by throwing out ballast, the observer may manage to descend in safety.

At Kunersdorf in Germany two balloons were hit by shrapnel from a range of 5000 metres, one balloon at an elevation of 300 feet, and the other at an elevation of 800 feet: at the twentieth round both were hit by from twenty to ninety bullets. Consequently, even at very long ranges, shrapnel is a formidably enemy to balloons. In actual war, however, it will be impossible to estimate accurately the distance of the balloon and its elevation. It will sway in windy weather and can be moved up and down and to and fro when necessary. It must also be taken into consideration that none of the enemy's batteries will be ready to open fire on the balloon immediately on its appearance, so that an effectual fire cannot be brought to bear on it for from twenty minutes to half an hour, by which time the balloon will have fulfilled its mission, and the observer, when he finds the fire becoming dangerous, can signal for the balloon to be moved to one side; or he can have the balloon lowered, and the crane removed to a position further forward or back, and so oblige the enemy to commence his sighting shots over again. Accuracy and continuity of observation suffer not a little from such manœuvres, especially when there are several balloons on a position. This is one of the reasons why a balloon park should have not less than two filled balloons always ready for action.

The nearer the balloon is to the enemy's position, the more unsafe it is, as the accuracy of the fire and the possibility of an exact determination of the distance to it become greater, but at the same time the angle of elevation increases for the guns, and, though siege guns and mortars can fire at these elevations, field guns cannot. It may therefore be laid down that, at a considerable height, 1400 to 1800 feet, and at near distances not exceeding 1200 to 1400 yards, a balloon will be almost safe from field artillery; so that on occasions an observer can brave the fire and go forward in safety. However, the nearer the balloon approaches to the enemy, the more dangerous becomes the position of the crane and personnel. Hence in such a case the crane must be well under cover in brushwood, groves, or woods. In the defense of prepared positions and in fortress warfare it will be possible to place the crane on a suitable earthen slope, but this is only a palliative and will only be efficacious until the enemy finds out its position. Besides, an embankment ties a balloon to a fixed point and prevents its manœuvring. In our opinion mobility affords the most reliable and convenient protection to the balloon and its personnel.

As observations taken from a distance are only valuable in reconnaissance and not for technical purposes, on every occasion on which observations can be carried out within two or three thousand yards from the enemy's position, a great advantage will be gained, as they can be taken without the aid of telescopes. The observing parties should be practised at taking observations from long ranges as the most difficult, and it should be impressed on them that they must move forward as near the enemy as possible, and that the loss of the balloon is counterbalanced by the necessity of obtaining information. It may also be remarked that, though many experiments in firing on balloons have not been carried out, those that have been justify the conclusion that the observer runs no greater risk in the car than on the ground, where he could not fulfill his duty without moving in advance of an attacking force.

It need not be said that artillery must practice and devise means for taking the range of balloons; and perhaps a new gun will be invented, like the well-known 3 c. m. Krupp gun, which was used by the Germans before Paris without any great results. Perhaps also a new projectile may appear which will cause the gas in the balloon to explode.*

Speaking generally, balloon warfare is in its infancy, and requires considerably more attention than the question of the use of captive balloons during an engagement.

Finally the balloon, or, more strictly speaking, its crane, and personnel may fall into the hands of the enemy or be annihilated. This can occur when the balloon is left without an escort, as happens to artillery in war, or when the balloon goes too far forward, or if one position is carried by the enemy and the balloon has not made a timely retreat. Very likely the difficulty of destroying a balloon in any other way will lead to special dispositions for its attack. The observer in the balloon will always see the

* If the balloon is filled with hydrogen, it is recommended that the projectile should be fitted with a sponge-shaped platinum head, which will condense the gas on its surface and cause it to ignite.

advance of the attacking party and can retire; however, a strong wind, confusion among the personnel, the carelessness of the observer, or an obstinate determination to stand his ground owing to the importance of his observations may enable the enemy to reach the crane. The personnel will then act according to circumstances *i. e.*, they will fight and die round the crane like artillerymen round their guns, or destroy the apparatus and make a timely retreat. The crane will fall into the enemy's hands, but not the balloon. In the first place the observer can cut the attaching rope, and take a free flight, trusting himself to the mercy of the wind. In the second place, before resorting to this extreme measure, he can try and defend himself by hand grenades charged with pyroxaline. Two or three such shells thrown from the balloon would not appreciably lighten it, while the successful burst of one among the enemy would have a great moral effect, and would save the balloon at least long enough to allow of the arrival of reinforcements.

Thus even in this case, a captive observing balloon does not take part in war under very unfavorable conditions.

We have remarked above that balloons are undeniably better observing stations than watch towers, but that they do not exclude the use of the latter, if only because even one balloon requires a whole attendant park and heavy carriage, while a watch tower, though it is not a lofty observing station, requires only one carriage.

At a critical moment even a watch tower is not to be despised; its 80 to 100 feet of height is no small matter, the more so as it is impossible to carry about lofty trees and church towers, and they are seldom to be found when and where they are wanted.

Colbert narrates that in the battle of Wagram, Napoleon himself did not despise the use of a watch tower. "The Emperor went from one end of the field to the other in a state of great excitement, and in order to see the course of the action better, he climbed on a double ladder, which accompanied him, and issued his orders from it. He encouraged the troops by his presence and his apparent confidence of victory." In contemporary war the arena of fortress or field warfare will not be a field of battle which a commander can take in at a glance as of old, but a series of such fields. While in the contests of the armies of the present as of the past there will exist a decisive point and a decisive moment to be determined by the commander, yet a modern fight will be distributed over so large a rayon, that he will not be able from any point to survey the whole extent of the field. The leader can only take a comprehensive glance at the general course of the engagement by means of captive balloons and watch towers. It does not appear surprising that, in progressing modern times, the double ladder with which Napoleon would not part at Wagram will develop into a portable watch tower, or a captive balloon, accompanying headquarters to the battle-field, ready to afford, when the moment comes, an extra chance of victory in spite of smokeless powder.

LETTERS ON INFANTRY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Lieut. ODOU GUROVITS, 11th U. S. Infantry.

XI.

"THE ATTACK OVER OPEN GROUND."

NOTWITHSTANDING it is frequently dangerous to lay down details which must be altogether disregarded in certain cases and in certain others be materially modified, nevertheless, it is my intention to describe how I think an infantry attack upon a village over open ground should be made when supported by artillery.

It will, however, be necessary to compare the effect of infantry fire with that of artillery. I will begin by observing that the results attained at target practice in time of peace, are at times dangerously misleading. In action the result is entirely different. The simple fact that the range is unknown has a very decided influence upon the effect, especially with infantry, at those distances where the projectile rises in its flight above the height of man.

It is true that infantry is expected to find the range by observing the point of impact. This even in time of peace, is an exceedingly difficult task; in war on account of the smoke etc., simply impossible.

In case of an offensive attack the distances are unknown save in those exceptional cases (like at Le Bourges) where the village is well known to the attackers. Even then, the effect is uncertain on account of variations due to influence of moisture upon the powder. I have observed variations due to this cause alone which amounted to almost 1-10th of the entire distance. The artillery is far less affected in this respect. The bursting projectiles are readily observed, and the influence of the atmosphere upon the powder is always considered in the firing.

I succeeded but once in illustrating to both arms of the service the different results due to the unknown range and to explain the relative value of each fire by having the target practice of both infantry and artillery at the same time and on the same ground. I first directed a battery of six pieces to fire on a target representing a company in open skirmish swarms and then to fire at an artillery target representing 6 pieces. A company of infantry on war footing then executed the same task. The distances were unknown to the troops and happened to be between 1000 and 1100 metres. Sights, manner of fire, and with artillery also, kind of projectiles, were left to the respective captains. The result was very apparent.

Against the infantry target the battery had a 30 fold effect, and against the artillery target a 100 fold, when compared with the infantry company's fire delivered against the same targets.

One of the most important points to be considered was, that the time of firing, expense and total weight of the ammunition of both arms, were the same.

It follows therefore that in war any one who permits infantry to fire at a distance of 1000 to 1100 metres when artillery is available for the same purpose, is guilty of an enormous waste of ammunition.

If one considers a fight of infantry against artillery, the result will be still more in favor of the artillery, because the number of infantrymen firing decreases on account of losses, while the six pieces remain in action although casualties happen to men and horses.

As the opposing parties approach each other the conditions change more and more. The effect of the artillery fire does not increase when firing at lesser distances than 1000 to 1100 metres, because at that distance, no shot misses its aim, and the fire is annihilating. The effect of infantry fire, however, becomes more effective with every step nearer the enemy.

Then we found that, only after reaching a point about 500 metres from the object, could one speak of an effect of the infantry fire which could bear comparison with the effect of artillery fire, and that after reaching 200 to 300 metres from the object, the effect of both fires could be said to be the same.

Furthermore, when we consider the excitement of a battle, the comparison will be still more unfavorable for the infantry, because the nervousness of every man carrying a rifle is bound to sway it more or less, while the cannon is not subject to a similar deviation.

It is true that the excitement and other circumstances affect the sight of the aiming cannoneer.

I remember that several batteries who fought gallantly at Königsgrätz, reported that after firing a certain time, our pieces carried too short by 300 to 400 paces, and this was ascribed to the fouling of the pieces.

Our theorists inquired closely into this matter, because at practice in time of peace, no matter how continuous the firing was, such an occurrence never happened, or at least never caused sufficient difference to be taken into consideration.

However, I strongly suspect that the respective aiming cannoneers neglected to examine the sights after each shot and thus failed to observe a gradual falling of the sight due to the shock caused by the discharges.

After such an occurrence, it is impracticable to remedy it unless noticed on the spot. With my batteries one never could observe such an occurrence with reference to the fouling of any piece.

I had frequently, however, to employ radical measures to enforce the prescribed service of the pieces according to regulations, especially if the enemy's fire commenced to tell, when I often observed badly aimed shots.

All these neglects can be remedied and enforced with artillery; with infantry, however, it is out of reach of any man's power to control the sighting of the rifles, especially in the heat of action. These observations explain why the regulations of March 1, 1876, limit the employment of infantry fire to within 500 metres, excepting against large targets (columns, etc., par. 101). The reason this paragraph was materially changed later is that one desired to make the paragraph applicable to all changes of effective distance which might arise from the improvements of our fire-arms, thus forcing extension of range.

The changes and improvements, however, up to the present* are not of such importance as to call for a radical change with regard to longer distance and accuracy. I therefore believe that I will not be wrong if I prescribe for infantry to open fire upon the village *lisière* when 500 metres from it, provided this infantry is supported by artillery. But it is very desirable that the infantry does not open fire too soon, thus avoiding the possibility of being without ammunition at the final critical stage. Of course one must suppose the defenders also to be supported by artillery. Then the attack will invariably begin by the artillery of the attackers combating that of the defenders; not until the defender's artillery ceases its fire can the attacking artillery open fire upon the village *lisière* and it will for that purpose, in order to attain the very best result, approach it as near as possible *i. e.*, as near as the hostile infantry fire will permit. The effect of the latter fire, with the latest improved arms, may be regarded as zero for ranges of 1600 metres and over. Therefore, the artillery will choose a position between 1600 and 2000 metres with a view to commence action against the *lisière*.

In the meanwhile, the infantry advances, avoiding carefully any masking of the artillery, so as not to lose this protection, and unites its fire at about 500 metres with that of the artillery. The latter then protected by the infantry fire advances to the decisive and annihilating distance of from 1000 to 1100 metres. Should the artillery happen to be more than one battery, then it will advance partly with the infantry by *échelons*, thus keeping up a continuous fire against the *lisière* with one-half of the batteries.

You probably are astonished to learn that I myself, an artilleryman, should prescribe that artillery advance to 1000 to 1100 paces from a village occupied by infantry, now that shrapnel shot is effective at over 3000 metres, and consequently the effect at 2000 must be a murderous one.

This close approach, however, I approve of, both as an artillery and an infantry officer. In the first place the observing and correcting at 2000 metres is not any too easy, and the effect is as yet doubtful. Therefore as an artilleryman I ask to be permitted to move nearer. So much from an artillery standpoint.

The infantry has a right to demand the protection of the artillery until the final rush. This cannot be performed by artillery when at 2000 metres, because at such a distance it is hard to distinguish friend from foe when they are approaching each other. Furthermore, badly aimed shots as well as premature bursting projectiles may endanger the infantry. Therefore as artilleryman I would have to cease firing as soon as the infantry reaches 500 metres from the object which is to be attacked. This is one reason for moving nearer. At from 1000 to 1100 metres, however, artillery can continue to fire up to the last 100 paces of the engagement, because artillery at the present time fires so surely and accurately at such a distance that such an occurrence would be impossible.

It is certainly not encouraging for infantry to leave the supporting artil-

* 1884, remark by translator.

lery a mile behind while it advances until the white of the enemy's eyes can be observed. Supporting artillery at such close proximity has a wonderful moral effect upon the infantry at such critical moments.

How great this moral and actual support of artillery is upon infantry can be judged only by persons who have heard the hurrah of infantry at such times to that artillery which remained with them.

It is but a short time since I urged the artillery to remain at such a distance from the village as not to be within reach of the infantry fire, and possibly you may now claim that artillery cannot approach to 1000 or 1100 metres from an occupied village, because the infantry, with their greatly overrated modern rifles, will destroy the batteries at that distance. Experience, however, has taught me that infantry fire at that distance is not so effective. There is truth in the adage that "Not every bullet carries death with it after leaving the muzzle of a piece," and this is proven by comparing the number of dead and wounded with the number of bullets spent. At St. Privat I was in position with my batteries from 2 o'clock until 5 o'clock P. M.

We were opposed by three lines of infantry, the first of which lay in front of us at about 900 or 1000 paces in the folds of a ploughed field. Each of these lines was three battalions strong and each of them fired at nothing but my batteries. It is true that we met with considerable loss, but not even one piece of these batteries ceased firing during these three hours. It happened sometimes, however, that the hostile artillery smashed a wheel or some other part here and there. As soon as the batteries were ordered to advance with our infantry at 5 o'clock, out of the 84 pieces but three remained back temporarily on account of necessary repairs. All other damage had been repaired while exposed to the infantry fire.

The losses caused by the infantry fire were much less when our skirmish line opened fire upon the infantry, because then the hostile infantry fire was at once directed against the skirmish line. For this reason I recommend that the batteries remain beyond the range of the infantry fire until we can respond effectively to this fire with our own infantry.

The war of 1870-71 destroyed the belief that artillery had to remain beyond the range of infantry fire. I do not see any reason why the artillery should be exposed to less danger than infantry. Moreover, artillery is not so much exposed as infantry is. Count the number of men in a front of 120 paces, which is the front of a battery, and the number of men necessarily opposed in a skirmish line and you will conclude that on account of greater numbers in the skirmish line and greater density, the latter must suffer more.

The hostile bullets striking pieces, wheels and horses, all of which are counted as hits at practice in time of peace, are not dangerous to men.

Therefore the artillery when occasion demands can expose itself to infantry fire.

Why then do I not demand that artillery advance with infantry to the close combat up to 500 metres? My reasons for not doing this are, that it is not always possible to fire over the heads of our own infantry at the enemy.

This, however, can always be done without danger to our infantry, if it is right under the highest trajectory of the projectile, but not if the infantry is 100 paces or less in front of our pieces. Furthermore, in spite of all improvements it occasionally happens that a projectile bursts before leaving the muzzle and then leaves it like a case-shot. At Montmédy I was about 800 to 900 paces in front of my batteries and there observed several such accidental shots and noticed pieces of the projectile jump as far as 200 paces from us. At 600 metres one is safe against such accidents. Therefore in the interest of infantry it is desirable to leave the artillery 600 metres behind that point where infantry will stay a longer time, for the final attack, in the same position to make the necessary preparations for the final rush.

Again it is not necessary to cease firing, in that position of 1000 to 1100 metres, as soon as the infantry commences the final attack. This would indicate to the hostile reserves in the village that a new phase of the fight is to begin. After the first hurrah of our infantry, upon reaching the *lisière* of the village is the right moment to direct one or two shrapnel shots out of every piece into the interior of the village, thus disquieting the reserves and without any risk of shooting at our own men because they at that moment cannot be far enough into the village to be endangered.

It is of the utmost importance to continue the artillery fire upon the *lisière* until the infantry line enters it—if this is omitted the entire preparatory artillery fire might become useless. It is true that we succeeded at Sedan where, in taking the forest of Garenne, we ceased the artillery fire and then only advanced with our infantry. Later on, however, I observed a case where the attack failed. In that case where the *lisière* was fired at so strongly that the defenders ran away on both sides of the village and sought shelter and then the artillery attack was ordered to cease to avoid shooting over our infantry, and not until then, the infantry advanced only to find every man of the defenders again in his proper place. The attempt failed three times. You must excuse me for not stating the date of this occurrence as I am unwilling to attach blame to a leader whom I highly esteem in every other respect.

So much about the support which infantry can expect from artillery when attacking a village. Further, infantry must always sufficiently consider not to mask artillery, and thus prevent it from firing, by remaining too close to it. How then will infantry proceed in such an attack? Since there is no cover available (and it is our supposition that the attack is over open ground) the fighting formations of the infantry will have been assumed before the first artillery position has been reached (1600 to 2000 metres from the village). Infantry will then probably have skirmishers in strong swarms (about two sections to a company). The immediate supports following in line in loose order. The second line follows entirely in line, with slight intervals between files, because I suppose that the hostile artillery has been silenced. Of course the supports of the first line as well as the entire second line, will not adopt loose formation (intervals between files) until they enter the zone of accidental hits. It will frequently be found advantageous to permit the supporting companies of

the second line to follow in rear of both flanks. This latter suggestion is also recommended in our regulations. But as a rule one will observe that the opposite of this recommendation is made use of, especially when a battalion is fighting alone, and then the battalion will usually prefer to follow the first principle taught in par. 85 and 87, of the regulations, viz., to advance the companies of the flanks and to follow with the remaining companies behind the centre where they offer the very best target.

Further, I recommend (and it is not in violation of the regulations), when the artillery takes position on one flank (which I will designate as the interior flank), the supports and companies should follow mainly behind the exterior flank, in *échelon*, because the artillery with the other flank offers protection against surprise and naturally weakens the immediate opposite wing of the defender more than the part opposed, to the exterior flank which therefore necessarily will require more support than the interior flank.

The regulations give but one direction with regard to the distance of the second line from the skirmish line, but recommend modifying it according to the ground; it permits the designated distance to be greater in open ground and prefers it to be as near as possible if cover is available. Since we are considering an advance over entirely open ground one must choose the greatest possible distance. At 200 metres the supports can open an oblique fire upon the flanks of any force attempting a flank attack against the skirmish line provided the supports are on the outer flank in *échelons*.

Let us then adopt 200 metres as a unit of interval, the skirmishers when attacking commence firing at 500 metres from the object, the supports will be 700 metres while the companies of the second line will be 900 metres from the enemy. The latter if lying down not exposed to fire. There is one point upon which too much stress cannot be laid: To get the correct distance from the firing artillery when the infantry passes by the artillery to the final attack. This is in time of peace, during the manœuvres, almost always neglected, while in war, owing to this very fact, almost invariably forgotten. It is but natural to believe an enemy, firing at one's self, to be nearer than he actually is, and light, weather, etc., have a great influence upon correctly estimating distances.

I cannot but recall here some of my own mistakes, which, however, were also made by others with me at the same time. At Königgrätz, after passing the Trotinka, I led my batteries through Jericek to their first positions. To obtain the best ground I rode ahead, and after reaching the elevated plateau, I came to the conclusion with the chiefs of batteries and divisions, that the distance to the hostile firing artillery on the historical wooded heights of Horenowes was 2500 paces. The first shot, however, taught us that the distance was much greater, and the fourth shot not yet reaching the enemy, although fired with an elevation of 4000 paces I moved forward to the next elevation of the ground in front about half the distance from the enemy. The artillery can correct more readily than infantry, who, as I have already remarked, can hardly be expected to observe the point of impact of their fire if fired upon by the enemy.

The error in estimating the distance might again be on the other side,

especially if one's view is dazzled by ground covered with snow between the enemy and the observer. In a slight reconnoitring skirmish at Nübel on the morning of February 10, 1864, a group consisting of ten or twelve mounted officers, stopped for a while at a house where the hostile projectiles hit the walls above us. The firing was done by a hostile patrol of three men behind a clump of trees.

We were amazed at the range of the Danish musket, and concluded after discussion that the distance was 800 paces. As soon as the patrol had been forced to retire, I ordered the distance to be paced, and then learned that it was 240 paces. The enemy labored under the same mistake, and therefore always fired too high. It is evident that such errors make our entire fire useless, and have but one effect, that of increasing the enemy's confidence. However, if one once committed such an error in the field, and was convinced of its possibility in any case, he by comparison would seldom err to such an extent again. The numerous attempts to use an accurate and practical range-finder, have always proved failures in the excitement of the battle and rapid changes. The artillery fire always was and probably will remain the most reliable range-finder, especially, as I remarked before, since that manner of finding the range is not influenced by any change of temperature or weather. If the artillery fire against the village lisière was effective I do not think that it would be necessary for the skirmish lines to take the double time until they arrive at a point 500 metres from the enemy whence they were to open fire. It is doubtful if the defenders while seeking cover from the fragments of exploding shells and shrapnel-fire have sufficient presence of mind to observe the approach of a skirmish line and, if they do, how many of the defenders will have the boldness to raise their heads from behind their shelter?

It is possible (it happened at Villejouan) that the besiegers may approach still nearer without firing. The infantry must strive to do this whenever the opportunity presents itself. It requires, however, previous instruction, because it is impossible to direct a skirmish line after they have merged into the fighting line. This falls within the province of the officers of the skirmish line only. Skirmishers must be frequently reminded that double time heats the blood and affects the accuracy of aimed fire, and should be taken only in extreme cases. It is not an impossible nor very difficult requirement to ask any skirmisher to advance in a quiet manner and with steady steps even under fire, provided the fire be not a murderous one.

At the combat at Fridericia, March 8, 1864, our skirmishers advanced over muddy, heavy ground; the shots of hostile infantry at long range fell about them, they observed them, shook their heads, smiled and continued to advance slowly over the heavy ground, running being an impossibility.

Therefore, when, possible, no double time is to be taken until the final attack with the bayonet.

If artillery is supporting infantry special care should be taken that no shot is fired, until a point 500 metres from the enemy has been reached, in order to avoid the possibility of lack of ammunition at the decisive moment.

It is surprising how rapidly a body of men fires away its ammunition, and it is out of the question to replenish it during the last stage of the fight.

All suggestions how to do this which have been made up to the present time must be rejected as impracticable, although they may be applicable to a fight at long range and when on the defensive.

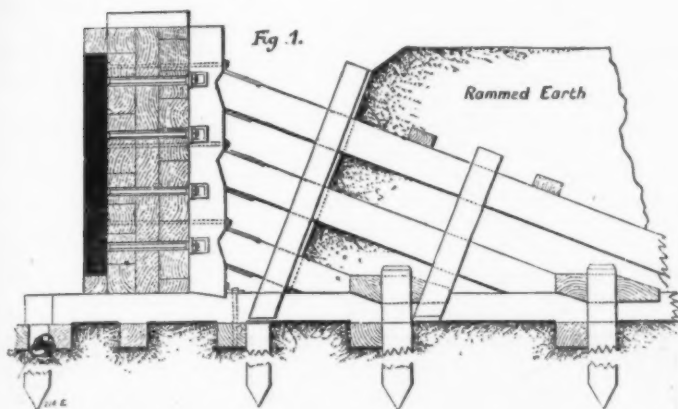
After the village of Villejeu had been taken the ammunition wagons could replenish the troops while a company in a defensive formation repulsed the hostile counter-attack.

At Beaune the men carried ammunition to the defenders in their helmets. But if a skirmish line, at about 100 to 200 metres, runs out of cart-ridges their replenishment is impossible. Suppose a man with the necessary courage and good fortune should reach the firing line with an ammunition bag containing 500 rounds, what will 500 rounds matter to a company. It is but three rounds per man, and how will you distribute them?

The firing line will approach the village lisière when it seems to have gained an advantage which is apparent by a weaker fire from the enemy or by the defensive fire entirely ceasing. This approach can be made by an advance of the entire line at a run or only the last position at a run, advancing by rushes with pauses of sufficient frequency to keep up the requisite firing. The entire line may move forward or the advance may be made by échelons, the échelons in succession lying down to fire.

Which of these methods will be made use of will depend upon the tenacity with which the enemy keeps up his fire.

In any case, however, it must be quieted entirely or at least materially weakened for an attack to succeed.



ARMOR-PLATE TRIALS IN AMERICA.

Reprinted from Engineering, London.

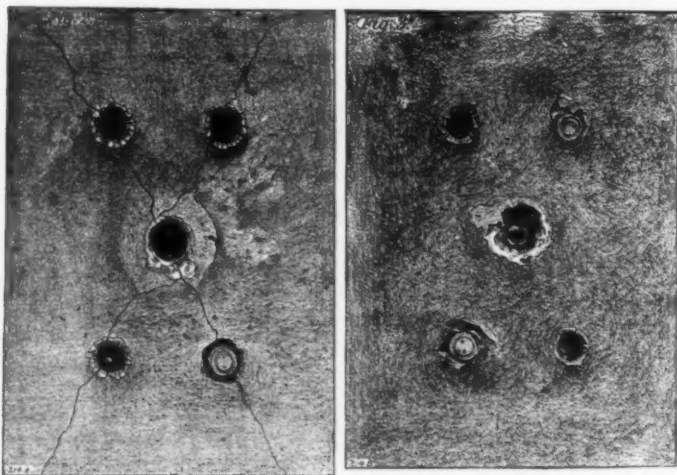
IT will be remembered that the United States Government advertised several months ago, inviting competition from the manufacturers of armor, both in the United States and abroad, and specifying the conditions of the trial. These were, in brief, that competing firms should supply a plate of armor, such as they were in the habit of making for actual use aboard ships, of the following dimensions: 8 ft. high by 6 ft. wide by $1\frac{1}{2}$ in. thick. These plates were to be supported by backings exactly similar in each case, and were to be submitted to five shots from an American 6-in. breech-loading high-powered gun, one shot being in the centre of the plate, the other four being placed in the corners of a rectangle 4 ft. high by 2 ft. wide, equidistant from the centre. When the competition was closed it was found that no American manufacturers were prepared to compete, and the only plates represented were two sent by Schneider & Co., of Creusôt, France, and one by Cammell & Co., of Sheffield, England. One of the Schneider plates was all steel, containing a very small amount of carbon, and the other was an alloy of steel with something less than 5 per cent. of nickel. The Cammell plate was compound armor of hard steel on wrought iron, such as has been produced by that firm for the British and for some Continental governments.

It was the intention to place these targets at a distance of 30 ft. from the muzzle of the gun, but when they had been set up, owing to the use of a gun of somewhat unusual length, the distance from the muzzle to the plates was only 28 ft. The plates were backed, as shown in the accompanying illustration, Fig. 1, with 3 ft. of oak and heavy struts bearing against upright pieces of 12-in. oak, with a mound of rammed earth over the greater part of the struts.

Following the original plan, the four shots in the corners of the rectangle were fired from the 6-in. gun on Thursday, September 18th. The Secretary of the Navy then decided to complete the trial by firing the centre shot from an 8-in. gun, and a postponement was had until the following Monday to bring this gun into position.

The gun used on the first day was a 6-in. breech-loading high-powered rifle of 35 calibres in length. The charge was $44\frac{1}{4}$ lb. of powder, giving a striking velocity of 2075 ft. per second. The projectile used was a Holtzer chrome steel shell, 17-in. long, weighing 100 lb., and having a striking energy of about 3350 foot-tons.

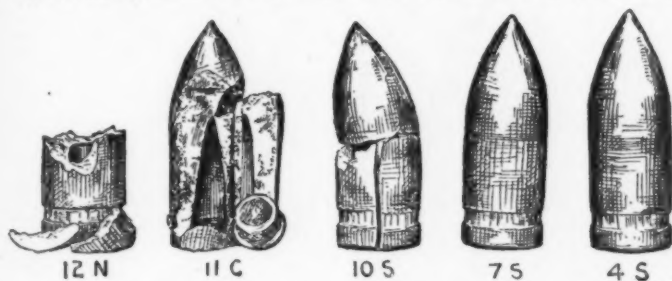
The effect of the four shots upon the all-steel target on the first day was merely local. Each shot penetrated entirely through the steel, as we have already explained. No cracks resulted from any of these shots.



The first shot in the lower right hand corner of the Schneider nickel steel plate, Fig. 3, penetrated wholly through the plate and broke into pieces; it caused no cracks whatever. The second shot on this plate, in the lower left hand corner, penetrated $4\frac{1}{2}$ in. beyond the further side and remained in the hole, protruding a little over 2 in. from the front face. The third shot, in the upper right hand corner, resulted almost exactly as did No. 2; except that it penetrated about 1 in. further. Shot No. 4, in the upper left hand corner, pierced through the plate, and the projectile broke up.

Shot No. 1 on the Cammell plate (Fig. 5), in the lower right hand corner, pierced the target completely, leaving a ragged hole shaped like a soup dish, about 3 in. deep in the face, while the rear end of the projectile was $21\frac{1}{2}$ in. from the face of the plate, showing that it had gone 10 in. beyond the further side. There were no indications of injury to the backing, ex-

cept one bolt driven well to the rear. Three large cracks were seen in the plate, two of them extending upwards and one down as far as the lower edge. The second shot struck in the lower left hand corner, and, as in the case of the first shot, fragments of the plate flew more than 100 yards to the rear. The projectile broke up, but the head passed far beyond the further side of the plate. The cracks previously made were now greatly enlarged, and the steel face on the lower right hand side of the target was largely broken away. Several large pieces bulged out to the front, like veneer scaling from furniture, varying in thickness from 1 in. to $2\frac{1}{2}$ in. Many other cracks appeared in the bottom of the target, extending to both edges and the bottom. Shot No. 3, in the upper right hand corner, pierced entirely through the target and set fire to the backing. The depth of the hole from the face was $2\frac{3}{4}$ in. As in the case of the first shot, there were many large cracks in the upper half of the plate and much scaling of the steel veneer. Shot No. 4, in the upper left hand corner, was broken into two pieces. About a quarter of the projectile was found immediately behind the backing; the remainder, after passing through the backing, took a slightly rising direction and buried itself several feet deep in the hill



about 100 ft. behind the target. The upper part of the plate was somewhat more wrecked than was the case with the lower-part, and the cracks between the upper and lower projectile holes were considerably enlarged.

The trial so far had taken place between 11 o'clock and half-past three, and there would have been ample time for the fifth shot on each target that day. Owing to the necessity of bringing up and mounting an 8-in. gun in place of the 6 in., a postponement was taken for four days.

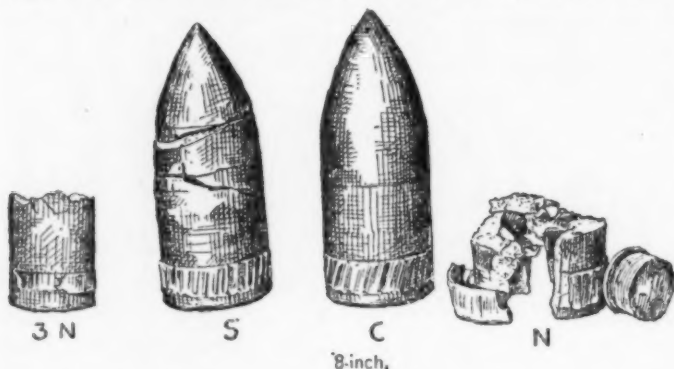
On Monday, September 22d, the fifth shot was delivered on each target, a standard 8 in. breech-loading rifled navy gun being used. The projectiles for this gun were manufactured by Firth and Co., of Sheffield, England, by the Firminy process. They weighed 210 lb.—40 lb. lighter than the standard shell of the 8-in. gun. The charge of powder was reduced to 85 lb., giving a striking velocity of 1850 feet a second, and a striking energy of about 5500 foot-tons.

The effect of the shot in the centre of the all-steel plate is further shown in Fig. 2. The shell itself was broken into three pieces, all of which were ejected from the hole, which was 16 in. deep. Following the invitation accorded by the corner shots, cracks extended from the centre through the

corner punctures to the limits of the plate, making an almost regular letter X. Probably these cracks extended entirely through the plate.

The centre shot against the nickel-steel plate broke up into very small pieces, except the head, which remained imbedded in the plate, through which it penetrated 3 in. or 4 in., as shown in Fig. 4. There was no crack whatever made by this shot.

Owing to the condition of the Cammell plate it had been thought probable that the 8-in. gun would not be used against it for fear of injury to the gun by flying fragments. Having made a very careful and effective protection for the chase of the gun, however, Secretary Tracy ordered the fifth shot delivered on the Cammell plate. The projectile sent a shower of fragments flying many hundred feet backward, some of them of large size. One piece narrowly missed breaking up the muzzle of the gun. A ragged hole, somewhat larger in diameter than the projectile, extended entirely through the plate, and backing, and the steel face of the target was almost wholly torn off. Strips about 6 in. wide extended down each side, but otherwise



the steel was completely knocked away. The projectile passed through the backing and through one of the 12-ft. struts and penetrated 15 ft., with a rising direction, into the earth. When found its axis was pointing at an angle of about 45 deg. from the vertical, back toward the gun, and the projectile was practically uninjured. Fig. 6 shows the state of some of the projectiles when found. They are marked N, C, and S accordingly, as they were fired against the nickel, compound, or steel plates. The numbers denote the rounds, one round being fired at each plate in succession.

In view of the results the United States Navy Department has decided to adopt the nickel-steel alloy for the armor of its new battle-ships. Evidence of this intention is given in the appropriation by Congress of \$1,000,000 for the purchase of nickel ore. It was plainly stated in both the Senate and the House that the Government considered this appropriation a naval necessity, and it was, therefore, rushed through both Houses without the least opposition, even from the most celebrated economic objectors in the opposition party of the Lower House.

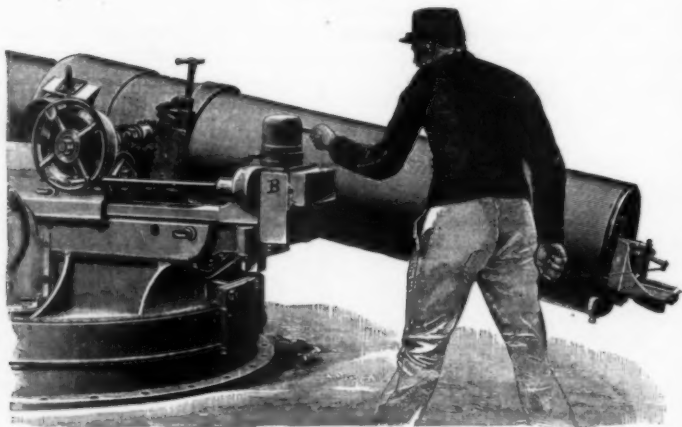
Although nickel is a metal very commonly used, it is not produced in very great quantities. Only twenty years ago the whole production of the world was about 600 tons, and the price in Great Britain was 11s. a pound. The present price is about 2s. 6d., and the reduction has been due to the discovery of nickel ore in New Caledonia, where the present output averages about 900 tons a year. Recent discoveries of nickel ore have been made in the United States and Canada, the largest deposits being found at Sudbury, Canada, a mine owned principally by Ohio people. It is to this supply that the United States Government will probably turn for the purchase of its ore under the recent appropriation, since it is expected that it can there be mined for about 1s. a pound. The ore is placed on the free list of the McKinley Tariff Bill, and it will probably be smelted and refined



by the Bethlehem Works in Pennsylvania, which have a contract for the steel armor, to be used on several of the American battle-ships.

Although this money has been voted we shall be surprised if the American Government rush into the manufacture of nickel-steel plates without further trials. No doubt this plate behaved splendidly, but no prudent person would mould a policy involving the spending of tens of thousands of pounds on a single test. The compound plate was a failure, but in other trials it has given much better results, and it would be as unwise to condemn it on this single instance as to adopt its rival. We are not seeking to decry the nickel plate; possibly every plate will turn out as good as the one tested, but this is a matter that ought to be proved, and not to be assumed on the strength of this isolated experiment.

Military Notes.



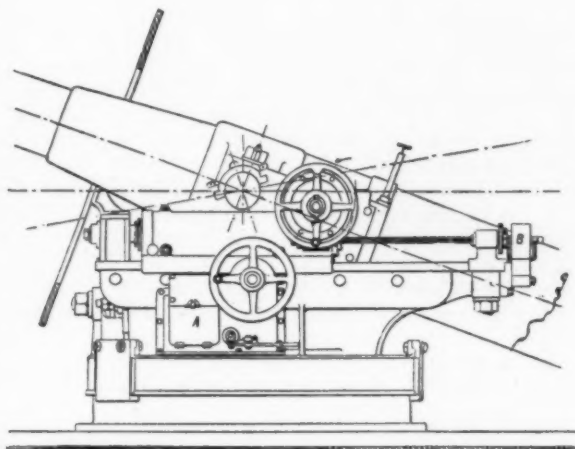
MODERN FRENCH ARTILLERY.

THE CANET SYSTEM OF MOUNTING QUICK-FIRING GUNS.

THE *Revue d'Artillerie* of Paris published a very complete notice of the Canet quick-firing guns, that were shown by the Forges et Chantiers de la Méditerranée last year at the Paris Exhibition, in the Pavillon of the Ministry of War; amongst these was an extremely interesting installation that was only very briefly described—a 15 centimetre gun of the quick-firing type mounted on its carriage and completely equipped with electrical devices for working it. The arrangement was a very suggestive, as it was a very novel, one; many able engineers in France, in England, and in America, have advocated the use of electricity on ships of war as the most convenient means of transmitting power, and for a long while the Forges et Chantiers Company, at their Toulon works, have experimented with this system, and have even substituted it on a large scale for hydraulic transmission. The exhibit of the electrically-worked Canet gun at Paris last year is likely therefore to have an historical interest as well as a scientific value.

The mounting of this gun is a central pivoted naval carriage, and consists of three parts—the carriage, properly so-called, the under-frame, and the base-plate. In order to reduce as far as possible the strains upon the

deck that are caused by firing, and which in guns of this calibre are very considerable when so frequently repeated, the slides of the under-frame on which the carriage rests, are made horizontal. By this arrangement the mountings of relatively large guns can be secured to comparatively light decks. A hydraulic brake with the Canet central counter-rod arrangement sets somewhat narrow limits on the recoil, and the gun is brought back to firing position by means of the recoil energy stored up in a series of springs. The gun is trained for elevation in the usual manner, that is to say, a toothed section is actuated by means of a pinion and Canet differential gear; this arrangement has, however, certain modifications introduced in order to reduce friction and resistances in the various parts as far as possible.



The gun itself presents no special features, being on the regular type of Canet quick-firing gun; it is 48 calibres in total length, and is formed of a central steel tube with surrounding jackets that as far as possible gave a uniform strength longitudinally and transversely; the breech-closing mechanism is of the model we have already illustrated and described, with a screw block operated by a horizontal lever, which with a continuous motion, gives to the block the three required movements of rotation, extraction and translation.

The gun is trained horizontally by means of gearing that engages in the teeth of a ring fixed to the bed-plate. All the details for manœuvring the piece are thus arranged so that they can be worked by hand; the electrical devices that we are going to describe have been added, so that all the necessary manœuvres may be performed without effort, when desired, at a distance from the gun. For training in elevation, a small electric motor B, is placed on a bracket bolted to the rear of the left-hand frame of the carriage and forming an extension of it; the armature runs on a horizontal shaft. On this is mounted a bevel wheel that gives motion to suitable

gearing, and to a spindle that actuates the elevating gear already referred to; the last-named spindle is supported on a bracket also bolted to the frame, and the device is always in gear with the elevating rack, whatever may be the relative positions of the carriage and the gun. The whole arrangement is, as will be seen, similar to that in which the training gear is controlled, by a shaft and hand-wheel at the back of the mounting.

It should be mentioned that the shaft can be thrown in and out of gear by a clutch, so that either the electrical or the hand training device can be employed. For training horizontally, a second small motor is employed. This is also mounted on a bracket on the left-hand side frame, and the armature revolves on a horizontal shaft; by means of gearing motion is transmitted to the pinion that engages with the toothed ring on the turning platform, and a clutch is interposed in such a manner that by lifting a lever the electrical arrangement can be thrown out and the ordinary hand gear substituted. The motor that supplies the energy for training in elevation, weighs 28 kilos. (61.6 lb.); that for training in direction, 33 kilos. (72.6 lb.). The effort required for the former work is considerably less than for the latter, as the gun is almost balanced on its trunnions. The difference of potential at the terminals of the electric motors is in each case 70 volts; it is more convenient to work them with the same energy of current and to insert resistances in the circuit of the dynamo used for elevating the gun. The power developed by the smaller dynamo, when working normally, is from 30 to 35 kilogr. (217 to 253 foot-pounds) with a current of 6 ampères, and on an emergency, and 70 kilogr. (506 foot-pounds) with a current of 12 ampères. The larger motor furnishes, under similar conditions, 45 kilogr. (325 foot-pounds) of work, with a current of 7 ampères, and 90 kilogr. (657 foot-pounds) with a current of 15 ampères. A difference in potential of 70 volts was adopted as a standard, because the gun and carriage are designed for use on board-ship. In the French navy from 65 to 70 volts is the standard current in use for electric lighting, and the dynamos employed for this purpose can thus furnish current suitable for the electric motors on the carriage. At the Paris Exhibition a different arrangement was adopted, as it was not possible to take the current from the electric lighting circuits, and recourse was had to accumulators. Want of space and other unfavorable conditions made it impossible to show the system to good advantage, and in consequence of this the motors were worked only to about one-half their normal energy. The accumulators employed were those on the Commelin and Desmazes system. These accumulators consist of copper and zinc plates placed in an alkaline bath; the positive plate is formed of porous copper, and the negative of a metallic cloth made of tinned iron wire. The bath consists of a concentrated solution of zincate of potash. When these batteries are being charged by passing a current through them, the porous copper absorbs the oxygen and is transformed into a sub-oxide of copper; the zinc is deposited on the iron gauze, and the potash remains free in the solution. During the period of discharge, the zinc is decomposed in the water and takes up the oxygen, restoring itself with the potash into a solution of zincate of potash; the sub-oxide of copper is reduced by the hydrogen set free by the decompo-

sition of the water, and is restored to its original condition of porous copper. The plates so arranged do not require any preliminary formation, and as they resist chemical action extremely well, they are very durable, and are not liable to be broken down by mismanagement of the battery. It is this type of accumulator which is in use on board the submarine torpedo boat *Gymnote*, that was built at Toulon. The first experiments with them were very satisfactory, and the various difficulties common to all the devices of this nature for storing energy were practically overcome. At the Exhibition the installation used for furnishing power to work the gun mounting we have described, consisted of 45 cells arranged in three groups of 15 accumulators, each of which gave about .75 of a volt; each group being coupled in tension gave an electromotive force of about 12 volts, and by connecting the three groups in the same way 36 volts were available. In charging these batteries a mean current of 7 and a maximum of 15 ampères was employed; in discharging, the current ranged from an average of 12 to a maximum of 25 ampères. The total capacity was 200 ampère-hours for each cell, or about 160 watt-hours. The current was distributed by means of a four-way commutator placed on the left-hand frame of the carriage above the motor used for training the gun in elevation. Graduated tables were provided against which the levers that controlled the movements of the gun moved and indicated the angles, both vertical and horizontal, through which the gun and carriage were trained. By this arrangement both operations for elevation and direction can be performed simultaneously, and the man laying the gun has only to follow the motion, which is entirely under his control.

In his original design M. Canet introduced a series of rheostats into the circuit so as to obtain four different speeds of the motors at will. At the Paris Exhibition there were only three speeds available. In this arrangement the wires from the accumulators were so laid that the current from one, two or three groups could be thrown at will into the motors; in the latter case the maximum energy was obtained corresponding to 35 or 36 volts, a quantity considerably less than was required to develop the full efficiency of the motors. In spite of this imperfect installation, which was unavoidable from the local conditions, the device gave very satisfactory results and attracted considerable attention. Especially interesting in this arrangement is the facility given for training both in direction and elevation at the same time, as it is obvious that the work of laying the gun can be carried out far more promptly, and the rapidity of fire can be thus largely increased.

Fig. 383 is a view showing the motor, and the mode of working the commutator for regulating the speed.

We stated at the commencement of this article that the substitution of electricity for hydraulic power is a problem that is now very seriously occupying the attention of prominent naval architects. Several applications have been made in this direction on a small scale in the United States, and Mr. Maxim has also been working on the same problem. The special application to a quick-firing gun by M. Canet last year at the Paris Exhibition was, we believe, the first practical example in this direction

shown to the public; but before that date the problem was well advanced, and at the La Seyne works of the Forges et Chantiers de la Méditerranée, a very important application of the system is almost complete. This is no less than the abandonment of hydraulics in favor of electricity for working the gun turrets of three ships of war; the French Admiralty is also turning its attention to the same subject. We believe that in France, especially in arsenals and shipbuilding yards, the transmission of power by electricity has found a larger application than in this country, for working cranes, travelling bridges, etc. The solution of this important problem cannot fail to attract great interest, for the results involved are of the highest possible importance. It is evident that if electrical power can be relied upon, and the disadvantages attending its use overcome, that it presents great advantages as regards first cost and ease of maintenance and control, as compared with water power. It seems, indeed, most probable, that the departure exhibited by M. Canet last year will have larger consequences than he imagined at the time when he designed the apparatus for electrically raising, lowering and turning his 15-centimetre quick-firing gun.—*Engineering, London.*

CANADIAN DEFENSE.

In the June number of this magazine (*United Service Magazine, London*) appeared an able article on the Canadian Militia by the Marquis of Lorne. During my experience of fifteen years in Canada, no governor-general ever gained so thoroughly the confidence and affection of the people of Canada of both races. To his grasp of the military situation (perhaps second only to that of Sir Charles Dilke), Canada largely owes the establishment of the small-arm cartridge factory* and shell foundry at Quebec, and had he been seconded by his government, Canada would long since have converted in her own factories her mass of old smooth-bore 32-pounder guns into 64-pounders, on the Palliser principle, at a minimum cost, affording a rough, serviceable armament, easily handled by volunteers for the defense of mine-fields and the armament of earth-works at strategic points on her long frontier, quite equal to anything that could be brought against them overland. For the United States have but little organized mobile field artillery, even for their small regular army, nor any war-ships on the lakes, which treaty obligations forbid to both powers. Though such obligations have generally been overridden on emergency, yet the time necessary to launch ironclads on the inland waters would also give Canada time for counter preparations and British gun-boats could come up by the St. Lawrence, inland lakes, and Welland Canal, bombarding the American commercial cities on the lake shores.

Twenty years ago I urged the loan to Canada of some of the 12-pounder Armstrong field-guns, that were even then beginning to cumber Woolwich

*At the outbreak of the Riel Rebellion there were not sufficient cartridges in store, those served out to my column were eleven years old and unserviceable. Had it not been for the previous establishment of the Canadian cartridge factory, there would have been a dangerous likelihood of a shortness of ammunition. Yet Canada had since the withdrawal of Imperial troops trusted to a supply of ammunition from the other side of the Atlantic, so hard is it to persuade Parliamentary Ministers to provide for military emergency.

Arsenal, in consequence of our unfortunate return to muzzle-loaders, Lord Lorne's recommendation on the same subject, would perhaps have a chance of being attended to, but for the war between the various war departments of the British disunited States to which he alludes. The first idea in the mind of a departmental official is to get a cash balance against what he considers a rival department, without reference to the injury or benefit of the State, and he is rewarded by a grateful country according to the number of talents he lays up in his napkin. Nevertheless, Canada has purchased 84 rifled field-guns of the then Imperial pattern, and has 20 militia field-batteries, 3 of which marched nearly 1000 miles, and did good service in the late campaign against Riel, and yet the English militia and volunteers are without mobile field artillery.

I shall endeavor not to repeat the information so tersely given in the Marquis of Lorne's article, in which I fully concur. I am not, however, sanguine as to the possibility of teaching a Columbian Coast Indian to set a time fuse, or read the vernier on the tangent-scale of a gun, or even the letters on the ammunition cases; but these refinements were doubtless not intended by the Marquis, who is himself an excellent gunner, having gone through the School of Instruction for Reserve Officers at Woolwich, and having commanded an artillery corps on the coast of Scotland.

No doubt the Coast Indians would form a useful corps of artillery laborers for pulling and hauling, like the additional negro gunners in Jamaica, and to do the rough boat work connected with torpedo launches, besides being a useful sort of garrison infantry in a country where white labor is scarce and highly paid, and the supply of volunteers is very limited.

But more important than the employment of the Siwashes (Indians) is the utilization of the brain of the Canadian army, the scientifically trained cadets of the Kingston Military College. Mr. Mackenzie, in forming the college, omitted to legislate for the employment of a proportion of its graduates in those branches of the public service where their training would have rendered them invaluable. In the militia, North-west Mounted Police, Dominion Lands' Survey, public works, etc., they would be invaluable. The Conservative Government which followed that of Mr. Mackenzie, prefers to retain the patronage for political purposes. The initial error of omitting classical subjects from the entrance examination has largely excluded French Canadians, who, in their semi-ecclesiastical seminaries, are chiefly educated in classics. The Latin and Celtic races naturally seek government posts, and they are easier, under the present system, to obtain by political interest than through the competition of a military college.

The Imperial Government wisely gives four or five commissions in the British army to each term. The high estimation in which these officers are held in England is well known, and the value their military training will eventually be to Canada is obvious.

Unfortunately, they are equally esteemed in the United States as civil engineers, etc., and many have drifted over the border to seek the employment their own country refuses. I do not believe for one moment that any of these gentlemen would, under any circumstances, take up arms against their country, but a man's grave will probably be in that land which

gives him the mother of his children and the bread his own country has denied. Those employed in the English army will probably return to commands in Canada with a ripened military experience; but at present, I believe, not a single military college cadet is employed in the Militia Administrative departments at Ottawa.

Nor is there one in the offices of the Minister of Militia, his deputy, or of the Adjutant-General or Military Stores Department. Few commissions in the permanent artillery, cavalry, or infantry corps, have been filled by cadets, fewer still in the North-west mounted police.

The military college graduates are all nominally enrolled in the volunteer militia. But young men commencing life cannot afford the expenses connected with the support of volunteer corps, nor live for three hundred and sixty-five days on twelve days' pay—the period of militia training.

Universal conscription is the law of Canada. That it is so thorough in its provisions, and that the keystone of the arch of all efficient military systems, *i. e.*, universal liability to military service, is not absent as in those of all other Anglo-Saxon communities, is due to the fact that Canadians are face to face with the powerful Republic on their border.

The theoretically perfect militia law of Canada, though it is an example of military legislation for us at home, since the abolition of the silver streak has put us also face to face with powerful neighbors; yet, like every other law, its practical result depends upon its administration, which, from the meagre pittance supplied by Parliament, is faulty.

It is not generally realized by those who think only of the long 4000 miles of Canadian frontier, that it is vulnerable only at certain strategic points at which troops for defense could be quickly concentrated, for an enemy would have no object in invading the Western wilderness; and Canada is a long riband of interior lines of railway and water communication, easily broken, it may be said, and as easily repaired.

Perhaps some estimate of the military power of Canada for defense may be gained by the consideration of her last campaign against the Indians and half-breeds, two thousand miles removed from the chief centres of population. Though the red man may be despised by those who have never had to cope with him in his native wilderness, they are the same enemy who have often baffled the troops of the United States. They annihilated the force of General Custer.

On the 22d of March, 1885, a dispatch was received at Ottawa that rebellion had broken out, and that the telegraph lines in the neighborhood of the *émeute* were cut.

On the 23d of June, 1885, the last shots were fired by Major Steele's scouts in an engagement with "Big Bear," who surrendered shortly afterwards without further resistance. In this short interval half a dozen engagements had been fought; troops had been collected and scout cavalry raised along what may be called a railway base of operations 3500 miles in length, from Halifax, on the Atlantic, to Calgary and Fort McLeod, at the base of the Rocky Mountains and beyond.

The transport, commissariat supply, medical department, and ambu-

lances were extemporized without even the embryo of the establishments considered necessary among professional soldiers. Camp equipage and ammunition were forwarded to the necessary points.

The difficulties were enormously increased by the complete absence of any supplies in the wilderness country through which the troops passed.

The season was the worst possible time of the year; the snows of winter had not disappeared, though too soft for sleighing. The grass for the use of horses and cattle was long in coming.

The Minister of Militia, Sir Adolphe Caron, wisely availed himself of the help of the Hudson's Bay Company for commissariat, and gave *carte blanche* for expenditure to the commanders of the Eastern and Western columns, whose bases of operations were 800 miles apart.

General Middleton, commanding the whole, subsequently formed secondary bases at Q'Appelle and at Swift Current, under Major-General Laurie, dividing his own force and forming a third column under Colonel Otter; the western column was under my command. The three columns eventually concentrated at Fort Pitt. The eastern and centre column moved about 200 miles, a part of the former proceeding by steamboats to Battleford. The western column marched about 500 miles; throughout the last half of the distance the troops and supplies moved simultaneously by land and river. Part of the force and supplies was in a flotilla of open boats. Touch was maintained throughout, and a final successful junction was effected by the river and land wings of the western column within striking distance of the enemy at Frenchman's Butte, where a desultory action was fought such as the character of the country and the relative strength of the opposing forces only permitted. A pursuit of the scattered remnants of Big Bear's band was continued for some time by portions of the three columns until the whole of the Indians surrendered. Riel had previously surrendered to General Middleton at Batoche. These operations were entirely conducted by the Canadian militia, without the assistance of any Imperial troops.

Only one supply train (from Swift Current to Battleford) was captured by the Indians. It must be remembered that the Canadian Pacific Railway was not at that time completed north of Lake Superior, and the troops, with artillery on sleighs, marched across the interval of railway connection on the ice of Lake Superior. Such operations suggest a hardihood—I may say an innate genius for war—on the part of the Canadian people which argue ill for the permanent success of an invader, were they determined to defend their soil, backed as they would be by all the power of Great Britain, and her facility for counter-attack by her fleet on the defenseless cities of both Atlantic and Pacific seaboard, and an attack on Canada by the United States would merit the severest reprisal on the part of Great Britain.

The population of the Southern States was about 4,000,000 against 40,000,000 when they made their heroic defense. Canada to day has about 5,000,000 against 55,000,000.

True the Southern States had the advantage of the best generals. But

they were without an ally in the world; their ports were blockaded, Irish and German mercenaries flocked to the standards of the North, and yet it took four years to trample out their stubborn defense, overcome at last by hunger, sickness and sheer weight of numbers. How would it have fared with the North had the Southern States formed an integral part of the Empire of Great Britain, as Canada does if she remain true to herself?—*Major-General Strange, British Army.*—*The United Service Magazine, London.*

A PROPOSED NEW CAVALRY DRILL.

It may be interesting to officers of the mounted arm to have before them the details of a proposed new system of squadron and regimental drill submitted by Major-General Keith Fraser, whilst Military Attaché at Vienna, to meet the necessities of the modern battle-field in these days of magazine rifles and improved infantry fire:

1. That an entirely new and thoroughly revised edition of the regulations for the instruction and movements of cavalry be drawn up on the lines of the admirably arranged drill-books of Continental armies, especially those of France and Austria-Hungary.
2. That the guiding principles introduced in the Austro-Hungarian Cavalry by Baron Edelsheim in 1862, and long ago accepted as the standard of drill by such cavalry commanders as Prince Frederick Charles, General Von Schmidt, Von Wright, L'Hotte, Gallifet, Rosenberg, Koehler, and many others, be adopted to their fullest extent in the British service.
3. That in future leaders should be responsible for taking the shortest route, and those under their command for following them, "Follow your leader" and "Take the shortest cut" being maxims.
4. That the comparatively silent system of the French and Austrian Drill Regulations be adopted, and all unnecessary words of commands and trumpet sounds be suppressed.
5. That the signals of leaders and the direction and pace of their horses be considered as commands to be obeyed and followed.
6. That no movement should be executed which does not admit of rapid deployment in any direction at any moment.
7. That in future each squadron shall be divided into two troops of two half-troops (or divisions) each—*i. e.*, four half-troops per squadron.
8. That each half-troop (or division) be sub-divided into three groups or squads, which answer so admirably in the Austro-Hungarian Cavalry.
9. That the strength of a half-troop should never be less than 18—*viz.*, 12 in the front rank and six in the rear rank, inclusive of non-commissioned officers.
10. That the strength of a group should never be less than six—*viz.*, four in the front rank and two in the rear rank, and that each group may form two patrols.
11. That in the event of there not being sufficient men in the squadron to admit of its being divided and subdivided as above, the number of half-troops or divisions be reduced to three, and even two if necessary.
12. That the senior officer shall command the squadron, the second

senior riding in rear of it, superintending its discipline, and prepared at once to replace the squadron leader if necessary.

12B. That in column of divisions the second senior officer of each squadron shall ride on the outer flank of the column, and the two senior non-commissioned officers shall ride on the outer flank of the rear-rank man of the second and fourth (or third in the case of weak squadrons) divisions, from which position they can superintend the order and discipline of the squadron.

13. That each division (or half-troop) leader, shall be, as far as is practicable, the officer who has charge of it in barracks.

14. That the *serre-file* flank be entirely abolished, except as to the second senior officer and the two senior non-commissioned officers of the squadron.

15. That all manœuvring by "fours," be absolutely forbidden, and all field movements in such a formation, which only admits of facing an enemy if he comes from certain directions, be eliminated from the drill-book. Fours, sections, etc., only to be used for column of route, etc. (*Vide* Von Schmidt and De Brack, etc.)

16. That many movements at present executed by the half-wheel of troops shall in future be carried out by wheeling the head of the squadron, or by the individual incline of each horse.

17. That the "incline" to an angle of 45° shall be substituted for the present "incline," which is limited to 30° .

18. That only wheels from a "halt" shall be made on a fixed pivot.

19. That unless specially ordered, a body of troops shall always advance after wheeling without word of command, following its leader.

20. That all deployments, unless otherwise ordered, shall be made on the prolongation of both flanks of the leading body, which effects a great saving of time; for instance, that the second division of a squadron in column shall always form on the right, the rear sections on the left of the leading division. On the same principle, in a regimental column of divisions the second squadron shall form on the right of the leading squadron, the rear wing forming on the left of the latter.

21. That in forming column on any named squadron, the squadrons on the right shall move first into column, those on the left following them.

22. That in advancing or retiring in column of divisions from a deployed squadron, the right section shall invariably move off first.

24. That changes of position shall no longer be considered field movements, but that the commanding officer will take his regiment by the shortest route and in the handiest manner, by wheeling the head of the column or columns, or if the change of direction be less than the quarter-circle, by shouldering to its new position (the responsibility which is now shared by so many officers in such movements being thereby greatly diminished and resting only on the leaders).

25. That the so-called "quarter-column" (which is now a meaningless term), a formation from which, under the present troop system, all deployments are very complicated, be abolished entirely, and line-of-squadron columns at close intervals be substituted for it.

26. That the squadron leader should ride well away (at about 30 paces) in front of his squadron deployed and in column of divisions, and the same distance on the flank in regimental column, watching the commanding officer and in no way occupying himself with the discipline and order of his squadron.

27. That on the order to "attack," swords should be drawn, and the squadron leader shall at once fall back to the right hand of the third division leader, his proper place in the "charge" (otherwise a gradual reduction of pace might be accepted as a signal to slacken the pace of the squadron).

28. That regiments should be exercised much more frequently than is at present the case, in trotting and galloping for long distances (necessitated by the long range of modern firearms), and in charging, rallying in any direction, into column or line, behind their leaders, pursuing, etc.

29. That squadrons should be trained to gallop for from six to ten minutes, and then to deploy and charge.

30. That bases with swords held up, which are worse than useless, and confusing on the move (as two horses cannot possibly keep level to an inch at full gallop for long), and without the aid of which a perfect line can be formed even at a "halt," be entirely abolished.

31. That in future all distances and intervals be calculated in paces, instead of in yards, horses, lengths, feet, etc., as at present.

32. That the breadth occupied by a mounted man be calculated as one and a quarter paces—i. e., four men abreast occupying five paces.

33. That the length of a horse be taken as three paces (90 inches).

34. That the distance between front and rear rank, and between leaders of divisions and the front rank be reduced to two paces, which was the regulated distance in the British Cavalry up to 1862, and which is found amply sufficient in the Austro-Hungarian Cavalry and which obviates the undue lengthening of columns. (The distance between ranks can be increased, if deemed advisable, when squadrons are deployed.)

34B. That the squadron "interval" shall always be ten paces instead of twelve yards.

35. That the theoretical rates of pace laid down in the existing regulations of—

Walk	not to exceed	4	miles	per	hour.
Trot	"	"	8	"	"
Gallop	"	"	12	"	"

be rejected, especially as regards the gallop, the pace of twelve miles an hour never being adhered to in practice, and being far slower than that of any cavalry in Europe (except Russian).

Present English rate of gallop—352 yards per minute.

" German and Austrian do.—436 " " "

or more than two and a quarter miles in favor of the latter per hour.

37. The canter only to be retained for riding school and parade (not to exceed 300 paces a minute).

38. That in order to bring about quiet riding and order in the ranks,

and to lessen the fatigue of the horses and save their backs, the men should rise in their stirrups always in the field, after being carefully instructed in the riding school in the art of doing so, as is done in all continental armies.

39. That the men shall be taught to ride in the field with double reins and using both hands, it being impossible to ride over broken ground or to jump fences, riding only on the curb-rein.

40. That swords be drawn except for parade purposes only when the order and authority is given.

41. That the adjutant should act as aide-de-camp to the commanding officer (the second in command exercising a general superintendence).—*Army and Navy Gazette.*

Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that, as far as practicable, these "Comments" should appear under authors' names.)

I.

"Drill Regulations."

Col. T. M. Anderson, 14th Infantry, U. S. A.

AS Infantry officers have been invited to make comments, criticisms and suggestions on the Drill Regulations of the Tactical Board, I will submit a brief essay on the subject. It would have been more to the purpose if we had been permitted to try the new tactics experimentally and to have submitted our opinions officially based upon such experiment.

It is but fair to say that the Board has evidently been most painstaking and industrious, and that the result of their work is creditable and in many ways acceptable.

All methods of instruction are clearly and concisely set forth, and all tactical movements well considered and explained.

General Upton asked me a short time before his death, what I thought of the four as a marching unit or factor of movements? I told him that, considering the average width of our roads and bridges, it was satisfactory, and that the wit of man could not devise a unit of movements that would not be broken in battle. Any attempt to make it a permanent unit composed of the same individuals is simply impracticable and is not worth discussing.

And so, too, with the squad as a fighting unit, under the same non-commissioned officers. The idea is a Drill Board ideal. It will not work in practice unless we can have companies of two hundred men, kept full by constant and successful conscription. Every officer of experience must know, that with small companies this plausible plan would be broken up by details and casualties, and that you could never be sure of having the same men in the squad or the same non-commissioned officer in charge two days in succession.

Starting with a hundred men, after two months of campaigning in war, the platoon will be a small enough fighting unit; and at the end of six months the company itself may not be larger than a good sized squad.

It is evident that all company, battalion, regimental and brigade movements and formations are considered by the Board as merely preliminary to open order formations for fighting. We find therefore that in the proposed Drill Regulations nearly all movements are to be made from columns of fours or by movements of columns of fours. In company formations the "turn" is substituted for the "wheel." In battalion movements, in changes of front, the turn is, in all cases, substituted for the right or left half wheel. Division formation of two companies are abolished, and the double column on the centre at subdivision distance abandoned. The movements retained or substituted are practicable, but the omissions and changes noted bring us

face to face with these radical questions. Are we, in future, under all circumstances, to fight in open order? Are we never again to fight in line? Are movements in column of fours under fire always safer and better than movements in company and division fronts?

We are to meet the proposition that we are to abandon in battle the traditions of our race, the thin red lines of Waterloo and Balaclava, the firm blue lines of Lundy's Lane, Buena Vista and Appomatox, the shoulder to shoulder cohesion of the Saxon that has so often triumphed over the greatest odds, the wild rushes of savage foes, the swarming charges of the best soldiers of other races.

If it is really advisable to make this change, it should be done without regard to sentiment or tradition.

There may be occasions when even, notwithstanding the deadly effect of rapid firing arms of precision, it may be better to fight in line. When fighting behind a parapet, men will surely be put shoulder to shoulder, but even in the open field, the question will often arise, how can the greatest loss be inflicted on an enemy. Admitting that the loss in a line will be great, will there not be occasions when the greatest amount of effective fire can be delivered from a coherent line?

Taking the theory of our Drill Board and of all other advocates of open order fighting, that in the last crisis of battle and at the point of contact, all of the 'supports and reserves will have been rushed up to the front, it is evident that a solid mass will be formed. There will not be any open order at such a place, and the vital question is, would not a line of men of the same battalion have more coherence, either in giving or receiving a charge, than a heterogeneous mass made up of men from a half a dozen lines brought up in successive rushes from the rear?

The loss will be severe with any system of tactics that can be devised.

On the 12th of May, 1864, at Spottsylvania (or Laurel Hill) an open fallow field lay in front of Griffin's Division of the 5th Corps. I had then and there a much better opportunity of observing the effect of fire than I wished to have, or ever hope to have again. The rebel bullets struck over that field at as regular intervals as rain drops in a mill pond, before our line, in our line, and behind our line. Would not men scattered over that plain in open order have suffered as much as they would have done in line? In the heat of battle will men ever aim with accuracy?

I am not arguing against open order fighting. This part of the new Drill Regulations, with a few exceptions, is excellent, and in my humble opinion, the best part of the work of the Board. But for the reasons given, I do not think it safe to assume that we will never have to adopt any other method. We must consider, in the next place, whether the deployments and developments of the open order cannot be just as well made on the basis of Upton's Tactics, and furthermore, whether certain changes have not been made, which are in themselves injudicious.

If you were advancing against an enemy with a single battalion, in choosing your method of movement you would probably consider the nature of the ground, and the character and direction of the enemy's fire. A brigade and division commander would have in addition, to calculate on coalescing, and combining his various battalions, batteries and squadrons.

Let us take the instance of a brigade advancing under a flank fire. Would it not be better to move up in column of companies, thus presenting only edges at which to aim, than to move in a long column of fours exposing the whole length of battalions to cross-fire? Then further, if you had to come right or left front into line, would not the half wheel be better than a lot of columns of fours of the new tactics?

Movements in columns of fours or some other unit of movement, have to be made under fire in all tactics; but we all know that the attention of men in column will be

distracted by the enemy's fire, and that stumbling over killed and wounded comrades causes confusion and sometimes demoralization.

Let us take another instance of battalions in reserve. Where it is not known in which direction they may have to face or what deployment they may have to make, is there any formation from which any possible combination can be made so quickly as from the discarded formation of "Double Column on the Centre?"

This is the best possible formation where you are uncertain of your next movement. From it a change of front can be made in about half the time required from any other.

Then why discard the division of two companies?

This would be well enough if our companies hereafter were to be 250 strong. But because we change our tactics, does the Board suppose the nature and dispositions of Congressmen will be changed. By changing a coat does it change the character and size of the man inside of it?

A few months before General Upton's death, he visited the writer at Columbus Barracks, Ohio, to have a talk on tactics. For two days we talked and planned and figured, or rather Upton did, for he had a system outlined then, very much as we have it to-day. Skirmishers, company supports, and reserves of battalions, regiments and brigades. The General favored the three battalion formation and large companies. When I asked what we should do if we could not get large companies, he answered with sound common sense: why, we should retain the division. That will give us an approximation to the strength of a European company, and six officers. What worried General Upton was the adaptation of his tactics to battle movements of an army division, with the further evolution of open order from it. We figured on a front of about 1800 yards and a depth of 2000 yards, from the skirmishers to the file-closers of the last brigade reserve. I suggested to him that it would take too long to get the last fellows up, and that in a change of front the reserve would have to swing around on a very large segment of a circle. He said that did not trouble him so much as the mixing of the men of different subdivisions in the last ploy mass of battle. To meet this objection he thought his deployment to the front by numbers was a sovereign and sufficient remedy. I did not agree with him and he seemed worried that he could not convince me.

I told him then, as I say now, that a substitute would have to be found for his skirmish drill, but that his tactics provided ample resource to get troops into positions, for open order developments. That all drill regulations providing for a given number of lines of support and reserves were merely technical, and would be varied by every general to suit himself and the conditions in which he found himself in presence of the enemy. That all this had but little to do with drill regulations.

The practical questions as to movements in the school of the battalion and brigade are: which can be most readily taught, what best remembered and performed the quickest, and, most important of all, how the most effective fire can be most promptly delivered. With eight companies of 40 men, I have at the double performed all evolutions in battalion drill in from 30 seconds, to a minute and 45 seconds, I have timed these movements with the 9th, 14th, and 17th regiments of infantry and believe that all our other regiments can do as well. With full regiments the same movements can be performed in from 30 seconds to three minutes.

Can you do better with the new tactics? I doubt it. With a regiment of three battalions in marching column, with the usual intervals, could you bring them front into line and open fire or make an open order development as soon? I doubt again.

This question can only be solved by manœuvring a sufficiently large command to afford a fair test.

It is a common thing to hear that brigade drills are a waste of time, as our war experience has proved that brigades could be put in position, from columns of fours. So they were, and the more the pity. On many occasions we have known invaluable time and thousands of lives lost by the needless marching and countermarching of brigades under fire, because some brigade commanders did not know the first principles of the Art of War.

By trying to make movements exceedingly simple, we may fall into confusion. As we all know, some of our combined movements save a number of separate movements.

I cannot see therefore that the school of the battalion of the new Drill Regulations is quite as good as Upton's. The brigade movements can only be understood by studying the school of the regiment, brigade and division in connection. These movements seem well considered, except that the depth required by their tactics, if followed arbitrarily by a general officer, might lead to disastrous results.

Admitting, however, that the proposed tactics are good and sufficient, let us consider how they will suit a million of volunteers called into active service.

The principles of Upton's tactics are generally understood and well-liked throughout the country. First and last several hundred thousand militia have been trained in them, and nearly a million of discharged veterans are familiar with the principles of the old drill.

The improvement in a drill would have to be very great to justify a change. In countries where there are standing armies of half a million, and reserves of a million, all under one command, such a change could readily be made. With us, however, the conditions are very different.

The proposed introduction of open order movements is necessary, and should be adopted at once. But the question is, do not the Upton movements up to and including brigade drill, with a few minor modifications, afford just as good a basis for the evolution of the open order as the drill regulations proposed?

The seventeen setting up exercises, seems to be no improvement. The six inch interval, is, I think, objectionable.

The firing tactics seem awkward and bad in principle.

The wheeling movements should be retained as permissible, unless the six inch interval is insisted on.

The two company divisions, and the double column on the centre should be retained.

The standing or moving to the front in company columns of fours under an artillery fire, is, it seems to me, dangerous and injudicious.

Notwithstanding these objections, made with all deference, it is due to the Board to say that their work bears evidence of conscientious and painstaking endeavor.

The open order method is a prime necessity. As it stands on paper, it seems sufficient, but, as before remarked, it should be tested before adoption.

II.

"A Proposed Change in Artillery School Methods."

Capt. James Chester, 3d Artillery, U. S. A.

I AGREE with much that Lieutenant Hunter says about the Artillery School, although I cannot accept his statement that improvement *cannot come by any development of the idea upon which the School was founded*. I do not pretend to know what that idea was, except as it is exhibited in the organization and history of the School, but these establish the fact beyond any doubt that the School has been a growing institution.

The Artillery School on its present foundation, came into existence under peculiar

circumstances, and its organization and curriculum were necessarily adapted to those circumstances. It was hoped however, by every friend of the artillery, and doubtless by the founders of the school, that when the peculiar conditions disappeared, the school would develop into a purely professional institution. In its early years the school had to operate upon material which demanded special treatment, and its programme had to be arranged accordingly.

But the fountain from which that kind of material flowed, dried up shortly after the war, and the founders of the school knew exactly how much of it they had to deal with. They knew that after a certain date they would have very different grist in their mill, and that knowledge must have had some influence on the organization. It is reasonable to assume that the machine which they created was capable of adaptation to the purpose so plainly in view. Indeed the idea of development must have been the controlling one in the organization.

But there were some other breakers ahead which could hardly have escaped observation, and yet were not provided for. The supply of 1st lieutenants was limited. The time would come when the roster of 1st lieutenants of artillery would contain no name unknown to the class rosters of the Artillery School. What would the school do then? Should the class thenceforth consist of 2d lieutenants only, or should it be divided into two classes; the junior, consisting of 2d lieutenants recently appointed to the artillery; and the senior of 1st lieutenants who already held a certificate of proficiency from the school.

As already said that question must have been in the minds of the organizers when they drew up the original programme, and it is unreasonable to suppose that they would adopt a programme and an organization incompatible with its solution. To be sure they made no immediate provision for it. The event which would call for immediate action was then in the far off future, and questions of the moment demanded their attention. The advanced course could wait.

And so the Artillery School went to work on the lines of its original programme, and shut its eyes to all prospective demands upon it. But the spirit of growth remained in it. The original course was improved and expanded from time to time; new departments were added; its instrumental outfit was enlarged; and its professional library increased at a rapid rate. The progress of the school was satisfactory. The spirit of growth was manifest in all its departments. But it made no preparations for an advanced course.

Procrastination bore its usual fruit. Time stole by at a wonderfully rapid rate, and at last officers arrived for further instruction, who already held certificates of proficiency from the school, and the school was unprepared for them. What was to be done? What was done? Why, the school repudiated its own certificate and demanded that its alumni should graduate again, or, what was perhaps worse, retrace the course without the hope of a new certificate. This was disheartening to the student and ruinous to the school. No matter if the course of instruction was altogether new, the school should have honored its own certificate. And no doubt it would have done so if it had been prepared with an advanced course.

But the artillery school has done the artillery great good, and artillery officers should feel grateful towards it. If it has erred, it is never too late to mend, and its organization is flexible enough for any development. There is a wide field of usefulness before it, a much neglected field, which can furnish useful and instructive occupation for all the certificated student-officers which it can turn out for years to come. The cultivation of this neglected field will constitute the advanced course in artillery art and may be added to the curriculum without disturbing either the organization or programme of the school.

The goal of every artillery officer's ambition should be, to be able to solve the problem of defense correctly, for any given sea-coast position. To do this requires an amount of special information, practical experience and sound judgment, hardly to be looked for in the junior grades of the artillery hierarchy. The aim and object of the advanced course at the artillery school should be, to qualify the officer for this kind of work.

We are not unmindful of the fact that the problem of defense has come to be considered an engineer question in this country, although there are some symptoms of returning reason in the constitution of the Fortifications Board. The fact is, the artillery and engineers constituted at one time a single corps, and when they were separated the engineers retained some artillery franchises, to which as naked engineers they were not entitled. Among these was the problem of defense. But the problem of defense is a purely artillery question. It is simply the formation of the artillery line of battle, a tactical question which artillery officers ought not to delegate to anybody, nor permit any one to usurp. Construction belongs to the engineers, but the problem of defense is an artillery question.

Here then, in the highest department of artillery art, is the true province for the certificated student-officer's efforts. Instead of requiring him to retrace the old course, set him to work on this neglected field and see if he can raise anything useful on it. There is work on it for any number of them. Set half a dozen at work on the British Navy, as many more on the French, the German, the Spanish, and so on until the ships and their armor, armaments, draught of water, speed and coal capacity, and their tactics of attack are all known, for every possible enemy. And let the knowledge be real, and if possible personal. What interest would such a course arouse! and what an encyclopædia of artillery information the Artillery School would become.

When all necessary information has been collected, collated, classified and discussed, the study of positions would be in order. Positions should be studied on the ground, and not from books or maps. Necessary surveys should be made, hydrographical and topographical. Every possible development of an enemy's attack should be studied, and illustrated, and the maximum number of guns which he could bring into action, against any fort, battery or position, should be carefully determined. The ranges of his projectiles should also be calculated, and their angle of fall, energy and penetration.

From the data thus obtained the armament of the defense and its distribution could be determined and the artillery line of battle for that particular position could be planned.

Then the auxiliary defenses would demand attention. Their character, extent, position, management and protection at the several positions to be defended, would furnish instructive problems for the class. So also the proper garrisons for the various works, and the equipment, organization and management of their batteries, and the organization and operation of the magazine service, the position-finding service, the submarine-mine service, the machine-gun service, etc., all of which legitimately belong to the artillery. In short there is abundance of useful and instructive work to do, within artillery limits, which would in no way interfere with the present organization and courses of study at the Artillery School.

The great fault of the Artillery School curriculum as I see it, is, that there is too little artillery in it, and too much ordnance. If an artillery officer is unable to solve the problem of defense for any given position, or to organize and operate the defensive machine when it is put into his hands ready made, so as to obtain maximum results, it will be small satisfaction to the Nation to know that he could make guns almost as well as the Ordnance people.

Captain Wm. E. Birkhimer, A. J. A., U. S. A.

It is matter of congratulation not only to the Army but the Nation that the subject of sea-coast defenses is at last receiving consideration at the hands of those in authority. The generals commanding on the sea-boards and the Commanding General of the Army have the present year pressed the subject to superior and public attention in a manner not before equalled. Appropriations for defensive works, and armaments to man them, have been unusually liberal. Really it seems that the authorities are awake to the fact that we should hasten to prepare ourselves to be able to repel an enemy who may take advantage of our helpless condition on the sea-board, to ravage our coast and lay our cities under heavy contributions. We do not want many Behring Sea cups of bitterness pressed to our lips until we drink the very dregs. We make wry faces when we take our medicine, which fact shows that we, as a nation, have some sense of pride and shame left which may yet prove our salvation.

As the general officers before mentioned, especially the Major-General commanding the Army, have so urgently pointed out, we must have properly trained forces to render the sea-coast defenses formidable to the approaching foe. This necessitates the maintaining a competent artillery force of great professional skill sufficient in number to make some show of effective defense, particularly at the most important points.

To bring the artillery up to a proper standard as sea-board defenders, and to have it keep pace with the times and the duty that will be required of it, the officers of that arm must be fit for the various duties that will devolve on them. Upon the artillery will be devolved the task of directing complex machinery by which, with the assistance of our gallant Navy, the enemy is to be repelled from our shores. Without doubt that is the branch of our Army which will prevent the enemy, if he be prevented, from taking possession of our great commercial cities.

Hence the necessity for having that arm thoroughly instructed during time of peace for the labors of war, when the season for preparation will be gone. And this demands that our artillery officers should be competent for the onerous tasks that will in the event of war devolve upon them.

One of the principal means of preparing them is an artillery school. This we have in our service; an establishment of many years standing. It is of first importance that it be so organized and conducted as to obtain the best practicable results with the materials at hand or that can be commanded. Any fair criticism of the school as it exists, and its methods, will therefore excite interest, especially among artillery officers.

Lieutenant Hunter thinks that the system "as it now stands, is productive of small educational results at an unnecessary outlay of time, money and energy," and therefore, that a change is needed; and he proposes a plan to that end.

In commenting on this plan, one is somewhat embarrassed by the statement of the lecturer that he "may have stated as facts some evils that have ceased to exist" at the school as he knew it four years ago. This circumstance makes it uncertain what strictures, if any, indulged in, are based on facts, and, of course, makes it uncertain just how much cause for a change exists at the school in the opinion of the lecturer himself. It is to be regretted that, before the "plan" of the school was arraigned, the lecturer should not have ascertained definitely whether the plan of the existing school is obnoxious to his criticism.

There are some reasons for thinking that, had he done this, the school would not now appear in so unenviable a light as it did to his eyes four years ago. Within the last year the curriculum has been revised, and, it is hoped, been improved so as to adapt it to the needs of a scientific artillery. If the officers master this course of study

and experiment, their professional attainments, so far at least as theoretical knowledge extends, will be about all they will need in practice.

And that the system of instruction and the results obtained are not so disheartening as the lecturer would have us understand, we have some proof from a very respectable source, furnished after official and searching inquiry. A few months ago a Board of Visitors, appointed by the War Department, carefully examined into and made report upon the artillery school, its work, present condition, etc. It was composed of officers of rank and experience, and who are respected throughout the Army for their abilities and attainments. It stated that it was not only satisfied with, but approved the methods employed, and commended the skill, energy and success of the staff of the school and the instructors, by which they had so rapidly secured so high a state of efficiency, straitened as they were for suitable facilities.

So far from wishing the staff to be abolished, as to any part of the school, the board speaks of it in terms of commendation, giving as its opinion "that the school staff having thorough knowledge of the wants, methods and experience of the school, having always at hand the advice of all the instructors and being in a judicial position which frees it from partiality, is likely to make changes and test new methods as rapidly as wisdom and the best interests of the school will permit."

The report of this board is an emphatic endorsement of the school, looking at it as a practical institution for fitting officers for their work, and considering the difficulties under which the artillery labors in our service in asserting its true position as a scientific arm. Nor should it be forgotten in discussing this subject that here, as in other affairs of the world, that plan will be the wisest which best utilizes the means at hand or available to accomplish a certain work. This board evidently is of the opinion that this is being done at the Artillery School in a manner warranting great praise.

It is believed that the plan the lecturer proposes of a primary school of practice, to teach young appointees in the artillery the essential elements of their profession not already acquired, is an excellent thing, considered by itself; so also as to the school for recruits, and likewise the proposed advanced course, if it be practicable, has its meritorious features. As to the first, it is wholly practicable; there is nothing to prevent these officers from going to the school for the purpose indicated; but whether, under the circumstances of actual service, it be the wisest course to pursue regarding them, is another consideration upon which opinions will differ.

And first, let it be understood, that if the artillery is to be a scientific arm, officers appointed thereto should either have a fairly good scientific education to begin with, or sufficient education otherwise to base a scientific education upon, which they should acquire in the artillery after being commissioned. A scientific branch of the Army, with unscientific officers, is an absurdity. The mass is never better than the elements which compose it. Examinations which relate only "to fitness for practical service and not to technical and scientific knowledge" are not the kind that officers of a scientific arm of service should take pride in passing; nor is it such as they should be compelled to pass. Of recent years graduates of the military academy have with rare exceptions been commissioned in the artillery. If that practice be perpetuated, then it is doubtful if sending them, directly upon graduation, to the Artillery School is the better plan. It is believed to be better to send them to their posts with their regiments for two or three years at least, and even longer than that would be better still. There they would have a respite from the toil of study which, at West Point, with unrelenting lash, drives them for four years to the full capacity of their strength. At their posts they will learn something of the Army as it is. They will receive an introduction to their future home. To a very great degree, if their commanding officers be fit for their positions, they acquire that professional knowledge which, under the plan

proposed, they would learn at the Artillery School. And we must give commanding officers credit for doing their duty. We cannot assume that they do not. If we do this, then the proposed plan does not help us, for the commandant of the Artillery School may neglect his duty as well as any other commander. The proposed primary school for young officers would, therefore, duplicate what, in great degree, they should learn at their posts. It would seem that an artillery school which has this for its object would be based on an erroneous idea. It would simply be devoting time to studies that would be better pursued elsewhere. In adapting an artillery school to the needs of the service, this ought to be avoided.

As for the recruit-school feature of the proposed plan, while, unquestionably, it would be well to have recruits for a scientific arm instructed as thoroughly as practicable, yet the actual demands of service are such that it is not believed that they could all with advantage stop at the school for this instruction en route to their batteries. As a rule the batteries badly need all recruits they are entitled to. Let them go to those batteries, therefore, for instruction. It may be that a few of the brightest might first be sent to the Artillery School with advantage. If so, the school, as now organized, will be able to attend to their needs.

Regarding the first two branches of the proposed plan, it is believed that they do not afford sufficient advantages over the scheme and practice of the school as they now exist, to justify the change the lecturer suggests as desirable. It would be to organize a school for the instruction of young officers and recruits, with the attendant expense, which instruction, to no slight extent, can be given at the posts where the batteries of those concerned are located. Unquestionably at Fort Monroe, under the proposed plan, their instruction would be carried on to an extent beyond that given at the posts of their batteries; yet, for the officers, this is true under the present plan of the artillery school. The question is, would it be well to set up a distinct school for the purpose of teaching officers very little, if anything, more than what now may very generally be taught them at their batteries regarding elementary subjects; and for the instruction of recruits in what, under proper administration of post affairs, may now in great degree be taught them at their ordinary stations? After carefully considering the subject, the conclusion is reached that no particular advantage would attend this part of the proposed plan of the school, while it would have some disadvantages not incident to the present one.

The last and important feature of the proposed plan is that for the advanced course of officers. How in practice, would the instructors be obtained as suggested? Have the Engineers, the Ordnance, and any other departments, whose officers might be wanted for instructors or lecturers, always officers to spare for the purpose? Those departments generally have something for their officers to do. Can they take them away from their work at the request of the Artillery School, to make instructors and lecturers of them there? These officers should, to be satisfactory to the Artillery School, be among the brightest and best of their respective departments. But can the artillery, in reason, ask that such shall be taken from their regular duties for its benefit at various periods of greater or less length every year? That would be asking a good deal. It is believed that it would be asking too much. The departments upon which requisitions were made for officers, might consider the fulfillment of the demand a grievous burden. They would ask, and with pertinence, why the scientific artillery does not furnish its own instructors? What reply would be made? That the arm had not officers competent to the work? If so, the admission would be humiliating. It is believed, also, that it would be doing an injustice to the corps of artillery officers. The records show that in dealing with the practical affairs of this world, in all the spheres in which they are called upon to act a part, whether it is in military or civil

affairs, officers who have served in the artillery arm are second to those of no other corps of the Army. It is believed, therefore, that the proposed plan for securing instructors for the advanced course is impracticable; and if it were practicable, it would be unnecessary, the arm being competent to furnish its own instructors.

The lecturer refers to a possible course of lectures as part of the advanced course. This idea of instruction by lectures is one that has often been suggested as superior to daily recitation. Among the papers submitted by the Board of Visitors to which reference has already been made, were some favoring this change; but it was not recommended by the Board. Now, regarding this change in the method of instruction, it is to be hoped that it will not be adopted without careful consideration. It need never be expected that any lecturer can do the studying for the pupils, and the latter derive as much benefit from the course, as though they dug out the facts and information by dint of hard labor. It is an inexorable law that there is no excellence without labor. If a lecturer on any subject does the work, he will have the knowledge; while, if the pupils do not delve into the subject, they will remain ignoramuses. A lecturer can direct the train of thought; he can point out the channels in which information is to be obtained; by grouping apparently distinct, unconnected, yet really closely related facts, he may give the pupils a broader view of the subject than they could have without great time taken up in acquiring this, the philosophy of the subject; but he cannot do their studying for them. Hence Lieutenant Hunter well stipulates that any course of lectures shall be accompanied by "hard, systematic study" on the part of student-officers of the advanced class.

The recent Board of Visitors reported that it was deeply impressed with the ability and devotion of the officers of the school to their work; and that, in view of the excellent results already attained under the present system of instruction, they hesitated to recommend any radical changes, and had offered only a few suggestions looking to the improvement of the system, none of which embraced the proposed plan of the lecturer, or anything that approximated to it.

Upon a review of the whole subject, with all the information obtainable at this time, it is not believed that the proposed changes in the plan of the Artillery School would, if the attempt were made to put them into practice, operate for the best interests of the service.

Lieut. J. D. C. Hoskins, 3d Artillery, U. S. A.

It is with no little pleasure that I look back to the year (1873-74) passed as a student officer at the Artillery School. It was a year of profit to me in instruction and in experience in my branch of the service, which subsequent years of service at other posts have failed to provide. I do not like to hear the institution berated by those who should be its friends, particularly in the presence of officers of other corps and among strangers, though its shortcomings and the faults of the system under which it labors are fully appreciated. These, no doubt, are fully recognized by the present military authorities, and in due course of time, as opportunities offer, improvements will be made, as has been done in the past. The lecturer's plan of dividing the school into three branches is not favored. It is held that newly assigned officers should serve out their novitiates with their regiments and at their proper stations, where should be found all the facilities necessary for their education in all the duties, practical and theoretical, pertaining to their offices. Neither is the conversion of the school into a recruiting rendezvous favored. The batteries connected therewith should be maintained at the maximum efficiency, even at the expense of other batteries of their regiments, in order that the draft on the time of the student officer may be as light as possible. The real post-graduate school so much desired, sanctioned by law

and sustained by Congressional appropriations, should be the one at Fort Monroe. In building it up such lines may be followed as are adopted by similar institutions the country over.

Suitable instructors are the prime requisites, and only those in whom the essential qualities are inherent should be selected for assignment as such. The artillery has among its officers men who are born teachers, men who can serve their country much more efficiently as such than they will ever do as soldiers. Such should be sent to the Artillery School and kept there so long as they adequately fulfill all the requirements of instructors; nay, of professors. Each, with a full knowledge of the subject he is to teach and the ability to impart the same to his pupils in a comprehensive and agreeable manner, bearing in mind, meantime, that he is dealing with men who are his peers.

As to the kind of instruction to be imparted, it should be that best calculated to accomplish the student in all the duties that may properly devolve upon him as an artillery officer pure and simple, as an artillery lieutenant, as an artillery captain, as an artillery field officer and the commander of a regiment of artillery, or of a fortress. A curriculum so limited and embracing such problems as, how to raise, organize, equip, sustain, administer and employ a battery of artillery, the artillery of a division, of a corps, of an army and of a fortress; problems relating to the various systems of ordnance, how to select and employ guns suitable for the varied conditions under which they must be used, and problems relating to the protection by artillery of our sea-coast, harbors, seaport cities and boundary lines, would fully cover the two years to which the detail is limited.

Lieut. M. M. Macomb, 4th Artillery, U. S. A.

Lieutenant Hunter proposes three important changes in the Artillery School at Fort Monroe:

- 1st. A practical course of one year, for officers immediately after assignment.
- 2d. The establishment of a school of recruits at Fort Monroe.
- 3d. A higher post-graduate course of two years, combining theory and practice, for officers who have served with their regiments two years or more. This course to be based upon the lecture system, instead of that of recitations now in vogue, and to be entirely free from the routine work of the post.

The idea of completely eliminating instruction in ordinary routine duties of the post from the curriculum of the higher post-graduate course at the Artillery School, is in accord with the general feeling in the artillery as voiced by their representatives at the council convened at New York in the fall of 1887.

The lecturer's plan of effecting this, by having new appointees to the artillery sent to Fort Monroe for a year's preliminary practical instruction before reporting at the ordinary post, is original, and while it will strike many unfavorably, it seems worthy of serious consideration for the following reasons:

First, because it insures the presence at the Artillery School of a sufficient number of officers to attend to all routine post work in a thorough and soldierly manner.

Second, because it will insure every subaltern's receiving the same amount and kind of instruction under favorable circumstances and with the best material now available. Every lieutenant will be given a fair and even start in his profession,—from the scratch, so to speak, and without handicap. Under the present system this is far from being the case,—the instruction he gets depending too much upon the equipment of the particular post, the whim of the post commander, or the fancy of the captain.

Third, because it completely emancipates the young graduate from the thralldom of books and theory, and at once opens to him a new field, entirely practical, with duties

sufficiently varied and definite to keep his interest alive, difficult enough to keep his wits from rusting, and yet as the essayist remarks, leaving him time to keep his social faculties from stagnation.

Fourth, because it compels him to pass a competent and just board satisfactorily, before joining his regiment. Failure to pass would indicate in general, neglect of duty, and the penalty should be more severe than simply turning the officer back a year; he should at least be made to lose several files.

In regard to the branch of the school proposed for the instruction of recruits the lecturer is not very definite. If I understand him correctly he intends that the officers and non-commissioned officers of each battery shall form a *cadre*, the ranks to be filled by frequent accessions of recruits who will gradually replace the older soldiers, so that eventually the battalion would be composed of comparatively green men.

I consider this plan vicious in the extreme and not in accordance with the other principal ideas advanced in the paper.

I think that the artillery battalion at Fort Monroe should be a model for all others, and should reach the highest degree of discipline and drill attainable under the present organization. An excess of intelligent and trained men would be of special value here in the proper administration of the course of instruction.

The duties that the recruit has to learn are too elementary to make it worth while to send him to Fort Monroe. He could be as well taught them at his regular post, and the presence of so many untrained men at the school would lower the standard of efficiency. This should rather be kept up, even at the expense of the other posts if necessary, by assigning to the school men who prove themselves intelligent and who desire to profit by the educational advantages offered by the course for enlisted men. The benefit given by service at Fort Monroe could best be conferred upon the artillery at large, by changing the batteries more frequently, sending half of them, say, to their regular posts every year, thus giving each battery two years' service at the Artillery School.

Lieutenant Hunter's proposition to have the higher post-graduate course of two years' duration is a good one, and the time is none too long considering the ground that has to be covered by the modern artillerist. It seems to me a wiser plan than giving one year of practical and one year of theoretical work, as suggested by the artillery council. The lecturer's point of sending a man to his regiment as soon as he completes the preliminary practical course suggested, is, I think, well taken. It gives the young officer an early opportunity to become acquainted with his regiment, to which he goes equipped with a much better standard of comparison than when fresh from West Point, where his training was mainly theoretical.

The new order in relation to examination for promotion will do much to prevent a man's falling into habits of idleness, and when he is assigned to the higher course the officer should be ready to buckle down to hard work.

In regard to the manner of imparting instruction I would favor the "lecture" system as opposed to the plan of "recitations" and "marks." However valuable this latter may be in imparting a certain amount of elementary knowledge in a given time, it is too narrow for a post-graduate course, and places too high a premium upon a quick memory and a glib tongue. The former, on the contrary, encourages habits of deep thought, original research and independence, all necessary to a man who is ambitious and desires to rise high in his profession.

This system will require the hardest kind of work from the instructors, who would have to be selected from those officers of known industry and ability in special lines. These should form the permanent body of lecturers who would be intrusted with the work of keeping the course up to the times. Their work could very profitably be

supplemented by lectures from noted specialists in engineering, gun construction, etc. There are many such in the service, and they could doubtless be spared from their regular work long enough for the purpose. I do not agree with Lieutenant Hunter in depending upon a corps of lecturers temporarily detailed, and the plan proposed for obtaining them could not be carried out. Our only policy is to depend upon our own men for working up the course and then to call in noted specialists when we know just what to ask of them.

In closing my remarks I can say that I felt benefitted by the course which I finished at the Artillery School some four years ago, and I think that the present administration there deserve the thanks of the artillery for the improvements made in that interval. If a majority of us can by dispassionate discussion reach a definite conclusion as to the improvements still needed in the system now in vogue, I do not doubt that the changes will eventually be made.

Lieut. J. P. Wisser, 1st Artillery, U. S. A.

I have served at the Artillery School both as student and as instructor, and I must confess that the system of instruction by recitation at the black-board seemed entirely out of place for the instruction of grown men. That was the first impression produced on me by the school, and in my study and experience since then I have never changed my mind on that subject. The lecture system is, in my opinion, the only system to be employed; it must be combined, of course, with practical work. This will require of the instructor much hard labor, but it will give the student his information rapidly and in a tangible form, readily grasped and utilized—a foundation whereon he can begin at once to build—and it will inspire him with the desire to learn more, which last is not the least of the objects of education.

While at the school as instructor I had two courses of instruction—chemical analysis and the metallurgy of iron. The former I prepared myself; the subject-matter was imparted by a series of lectures, and supplemented by practical laboratory work. The result was entirely satisfactory. The interest taken was indeed a surprise to me. My only regret was that my lack of experience prevented my conducting the instruction of the officers of the class in a manner corresponding to their capabilities and the interest they evinced.

When the course was completed I went to Europe and studied, in the winter of 1883-84, at the Royal School of Mines at Freiberg, Saxony, where the lecture system is in use, and I was confirmed in my opinion as to the great advantages of such a system in the instruction of men. In 1884 I also visited the principal military schools of Austria, Germany, France and England, in all of which the lecture system predominates, and found no occasion to change my view. When I saw the enthusiasm of the officers of the Austrian Kriegsschule or the English staff college I could not help contrasting it with the disappointment experienced, and discontent exhibited, by the officers at our Artillery School, and felt that, in part at least, this was due to the difference in the system of instruction.

Without doubt, great difficulties have arisen which prevented the authorities of the school from doing much more than has been accomplished, and of late considerable improvements have been made. But more radical changes would, I believe, still further improve the school. I agree perfectly with Mr. Hunter that the Post and School should be separated and also endorse the general system proposed; but I do not consider the *detailing* of officers temporarily as lecturers, in subjects on which they are more or less authorities, a practical scheme. It takes a great deal of time and much labor to prepare a course of lectures on any subject, however great an authority the lecturer may be, and such men would be continually in demand elsewhere for work

that would ordinarily be considered much more important. I speak my mind freely on this point because I once entertained views very similar to those of Mr. Hunter, but a wider experience has caused me to modify these views somewhat.

Lectures are of two kinds. They may serve to instruct directly in the outlines of a subject exactly like a text-book, or they may be employed to illustrate special subjects or to present special views. The former is the lecture system proper, the latter may be employed to complete either the text-book system of instruction, as in the several departments of the Military Academy, or the lecture system of instruction, as at the Naval War College. In the lecture system proper, as in the text-book system, the instructor must be thoroughly acquainted with those under instruction, must judge of their previous knowledge, their capacities and their desire to learn, in order to conduct his system of instruction properly. My eight years' experience as an instructor here has taught me more and more clearly every year the difficulties a student labors under if the subject-matter is not properly presented. Therefore, in my opinion, the instructors who teach the general outlines of a course must be permanent in order to do themselves and their subjects justice, whether they teach by text-book or by the lecture system proper, as it is conducted abroad, and recently in our Eastern colleges.

For the illustrative lectures prominent men may with advantage be detailed, for these lectures presuppose a general knowledge of the subject, and such the lecturer can assume.

Thus, in the general course of artillery, after a series of lectures by the permanent instructor, giving an outline of the main features of the subject, the course might be supplemented by three lectures by an ordnance officer, who has devoted his time largely to that subject, on material; three or four more by another ordnance officer, prominent in that branch, on construction of ordnance; then say six lectures by some engineer officer of authority on sea-coast fortifications; four by some artillery officer of ability on the same subject; and three on the same subject by a naval officer. All the courses might be supplemented by illustrative lectures on special parts in the same way. This is practically the system in the higher military schools abroad and was adopted for the Naval War College. It is, therefore, founded on experience, and has, moreover, the sanction of the highest and latest authorities on the instruction of officers.

Lieut. E. M. Weaver, 2d Artillery, U. S. A.

Honest discussion never injured any worthy cause, therefore such a paper as this of Lieutenant Hunter's must be cordially welcomed by all artillerymen, whether they agree with the views expressed by the writer or whether they do not agree with the argument as a whole or in part.

In so far as I am personally concerned I warmly support some of the statements made, but to others I am opposed.

I do not clearly understand that portion of the paper referring to the instruction of recruits, where the writer says the recruits will be "sent to fill the batteries which will gradually be made skeleton." I would be glad if he would amplify this particular point a little.

It is proper to point out that the Artillery Council went over much of the ground covered by this paper, and that some of the conclusions arrived at by the council, as expressed in its report, are in general accord with Lieutenant Hunter's. For instance, the report contains the following:

"As it is the policy of the Government to maintain schools for the higher education of its officers, the Council respectfully offers the following suggestions:

"1. The command should be entrusted only to officers of well-known fitness for the duty. * *

"2. The commanding officer of the school and the superintendent of instruction should, * * *

with all of the instructors, constitute a Board of Instruction to meet at least monthly to act on all questions of instruction. * * *

"4. The officers under instruction should form two classes. * * * * *

"5. The course of instruction should be largely post-graduate of West Point, and should conform closely to the special objects of the school. The instruction should continue two years as follows: 1st year, *Practical course and the usual post duties.* 2d year, *Theoretical course solely.*

"Nothing can be more prejudicial to good work in the theoretical course of instruction than the constant interruptions of study and investigation, occasioned by the daily demands of guard duty, drills, boards, courts, signalling, target practice, roll-calls, parades, issues, etc.,—routine duties which prevail at all posts, which are important and serve a necessary purpose, but which should not impair the full value of the theoretical instruction."

There can be no doubt that the old method of detailing a battery to duty at Fort Monroe, and assigning its captain as the head of some or any department of instruction, was vicious in the extreme, but this practice may be said to be abandoned, for we find three of the new departments created within the last three years, are presided over by lieutenants selected on account of their special fitness for the positions, and this rule may be expected to obtain in the future, without regard to rank.

I believe the writer will find many who will prefer permanent heads of departments and instructors, to the non-resident lecturers he advocates. If one is charged with the supervision of a department of instruction, it is of the first importance that he have no other "fish to fry," and he must needs have other duties if, in the interim between his lecture periods, he is stationed elsewhere than at Fort Monroe. Furthermore, it is precisely during the intervals between the instruction periods that the head of a department will be preparing his lectures for the forthcoming session; if he be an honest and energetic worker he will not have time for other work, and if he have not time for other work why should he not remain at Fort Monroe where the materiel of his department is, and where he will have access to the fine technical library there to be had. Moreover, if the school is to be conducted by a board composed of the commanding officer and the heads of the departments of instruction as the writer advocates, the presence of each member of the board will be required from time to time in attendance on its sessions.

It is thought that most artillery officers will be in favor of using the utmost care and discrimination in the selection of chiefs of departments of instruction and instructors, but that after they have been thus carefully chosen, they ought to remain at Fort Monroe in direct contact with their work, and not be relieved from their duty there so long as the interests of the service are properly served.

This naturally suggests that the War Department ought to take means to prepare suitable officers to fill positions of so much importance. It ought to be possible to look ahead a little in such matters, and direct certain officers to give their attention to special lines of study, with a view to their ultimate selection for the positions; or, as has been done in the Navy in certain cases, and recently in connection with the Artillery School, assign prospective instructors to duty at the advanced special schools of this country and Europe where the latest and best special thought and practice of the world are to be found.

In reference to the method of imparting instruction in a post-graduate school there can be no doubt, in my judgment, that the recitation system should give place to a lecture system, and I believe, under the working of the new programme of instruction, the tendency at Fort Monroe is now in this direction.

It may perhaps be questioned whether it would be wise to publish all of the essays prepared by the student-officers, for circulation to artillery officers, as suggested by Lieutenant Hunter. But it would be a great boon if there could be disseminated from Fort Monroe an Eclectic literature more technical than we have been able to obtain thus far in the JOURNAL OF THE MILITARY SERVICE INSTITUTION.

It will be necessary also to object to placing strategy and tactics in the Fort Monroe course of study, "such as would be likely to be employed by a brigade commander." This is properly a subject connected with the use of field artillery and it should appear in the course to be prepared for the Fort Riley School. This is all the more necessary as there are several important subjects connected with sea-coast defense that are standing at the door knocking and begging for consideration and more time.

The point made by Lieutenant Hunter, which was also made in 1888 by the Artillery Council, that the course should be divided into a practical and a theoretical course, and that all new artillery officers should at once take the practical course, will, it is thought, be heartily commended by all artillery officers. Besides the advantages given by Lieutenant Hunter, and in the report of the Artillery Council, such a plan would result in establishing uniform customs throughout the artillery in all matters of daily routine and post administration. There will be differences of opinion as to whether the practical class should leave Fort Monroe after the practical course, and come back later for the theoretical course; or whether, after the year's respite from books it would not be better to have them continue on, taking up the theoretical course and finishing the whole course before leaving the school. It is conducive to habits of idleness to allow too much time to elapse after graduation at West Point before officers are introduced to their professional studies proper, and it is, furthermore, desirable that young officers should become interested in professional matters as soon as possible. Officers just graduated are also better fitted for study at the end of a year than they would be after several years of mental inactivity.

Lieutenant Hunter's suggestion that all recruits for sea-coast artillery be rendezvoused and drilled at Fort Monroe as a feature of the practical instruction for both the men and the officers of the practical class, will, it is thought, meet with general approval. By such a process officers and men would be products of the same system, and the effect would be to produce uniformity in drill and routine work throughout the artillery.

It ought to be brought out clearly that the present staff and instructors of the Artillery School hold the confidence of the officers of artillery. A new programme of instruction has recently been prepared and is now undergoing its first trial. As a programme it is a decided improvement on the one formerly followed, and it ought not to be doubted that the instruction therein laid down will be thoroughly imparted. It may be safely said that no officer ever passed through the Artillery School and attended conscientiously to all the duties placed before him, without being benefitted materially by the experience; and, while in certain courses of instruction the benefit was not commensurate with the energy expended, still, on the whole, the ultimate result was a gain. If this be true of the past how much more hopeful should we be of the future, especially if a number of the views advocated by Lieutenant Hunter be put into practice?

III.

"Our Northern Frontier."

Col. James G. Gilchrist, 3d Regiment Iowa N. G.

LEUT. A. D. SCHENCK, in the November issue of the *MILITARY SERVICE INSTITUTION JOURNAL*, furnishes an exceedingly interesting paper on the above topic, but it is inexcusably marred by two very serious misstatements. The first is in the depreciation of our military strength, and the second in an exaggeration of that of Great Britain. The article in question must have been written many years ago, before our National Guard organization was completed, or else he is singularly

ignorant of what this organization is. When he talks about mobs, poorly armed, undisciplined, and without equipment for the field, he is certainly without knowledge of what he is talking about ; or wrote years ago when such conditions did exist. If what he says is true of our State troops, certainly we had better disband our forces and commence again. But it is *not* true, at least as to the Northern States and some of the Southern. We have to-day, according to reliable returns, 109,000 officers and men in the National Guard, enlisted for service to their States *and* the United States, enlisted, for the most part, on the same conditions as obtain in the Army. All officers who have visited our camps and witnessed our mobilization in New York in 1889, unite in compliments to the average knowledge and efficiency of the rank and file, and pronounce the troops, in all but fire discipline, equal to the volunteers of the late War after a year's service in the field. To be sure a large proportion of the arms are old 50 cal. Springfields, but re-arming with the improved rifle is being rapidly carried on. The field officers, almost without exception, are men with war-records, and a very respectable percentage of the line officers are of similar training. There are many old soldiers in the ranks, both from the volunteers and regulars, and an enormous reserve of officers and men who served through one or more enlistments, and would step into the ranks on a call to arms, not as raw recruits, but as fairly drilled soldiers. These troops are so earnest in their work, that each man annually expends on his organization at least \$10 for every dollar received from the State and National Government. The officers give without stint in time and money, and if there is any other organization in the land that is more intensely patriotic, in a practical and unselfish way, I do not know where it is to be found. To confound this force with the "militia" of past wars, is inexcusable and almost insulting.

But there is more to be said than this. The regiments outside of New York and Pennsylvania are rarely larger than eight companies, with a maximum legal strength of 60 men. In most of the States the strength of the companies is fixed at 45 men and officers. If these regiments were filled up, on a war footing, the aggregate is something over 300,000 men. And, be it remembered, the increase would not be in raw material, but men of past service in the Guard, Army and our numerous military colleges, and colleges where military instruction is given. *All* of this force has elementary knowledge, and would be of a class that would soon acquire practical knowledge in the field. Now such a force is not contemptible from any point of view, and all who *know* them fully appreciate that fact.

The disparagement of our State troops (not "militia," in the old sense), is only equalled by the exaggeration of similar forces in Great Britain and Canada. But this does not concern us beyond calling attention to the fact that what Mr. Schenck says of them applies with far greater force to us, as I well know from personal knowledge and experience. Great Britain, in a war with us, would have to make it with her navy, and largely with volunteers. Her regular troops are not and cannot be available in large numbers. When we recall the facts of her Crimean campaign, the Soudan, and others of recent times, it does not seem at all likely that she will be so exceedingly prompt as the essayist would have us believe. Still that is a matter outside of my present purpose, which was to call attention to the unnecessary disparagement of our State military service, based upon, it must seem, entirely untrustworthy data.

IV.

"Light Artillery Target Practice."

Capt. Paul Roemer, U. S. Army.

I READ with pleasure Lieutenant Hawthorne's interesting article on "Light Artillery Target Practice" in the September number (46) of the JOURNAL, in which he points out the necessity of adopting a thorough system for conducting target practice, and a complete code of firing regulations.

The battle of the future will depend more than ever upon the effect of the artillery. Artillery should open the way to victory.

To accomplish this, artillery must know how to shoot, when to shoot, and to shoot well. Battery commanders must have complete control over their batteries, a thorough knowledge of drill and firing regulations, and a well instructed and highly disciplined body of men. The winter months could be devoted to theoretical instruction, and the practical instruction in the spring and summer months should be so thorough and so far advanced when the season for target practice begins, that the men have nothing more to learn, and that the practice on the firing ground, for all essential purposes, would be nothing more than battery drill under service conditions.

The result of the firing depends greatly upon the skill of the gunners in aiming properly, and in giving the right elevation. We do not pay enough attention to the education of our gunners. Every gun detachment should have, besides the gunner, from two to three cannoneers thoroughly instructed in the use of sights. One who watches the drill of the different gun detachments of a light battery, will observe the close attention that is paid to the details of the manual of the piece. The instruction in aiming and sighting is neglected.

This should not be. After the command "Fire" the gun could be moved back, to mark the recoil, then moved forward again, to compel the gunners to aim anew. To facilitate the instruction in aiming and sighting, every light battery drill ground should be provided with fixed and moving targets. These targets would be of the greatest service at battery drills. When these drills have far enough advanced, and if the extent of the drill ground permits, the use of blank cartridges could be made very interesting and instructive.

The battery could be divided, platoons manœuvring against each other, using blank cartridges. This would give excellent practice to the gunners in aiming and sighting.

Batteries should have target practice from five to six weeks every year. This practice should include known distance firing at fixed and moving targets; unknown distance firing at fixed and moving targets. The targets should represent infantry, cavalry, artillery, skirmishers, infantry in line of battle, etc. Moving targets should be arranged in such a way as to move towards and from the battery perpendicular and diagonal to the line of fire.

The firing grounds should be extensive, uneven, here and there covered with trees and underbrush; long and broad enough to enable battery commanders to execute movements, that have some resemblance to those on a battle-field.

As I have stated already, the instruction of a battery at the beginning of the target season should be so far advanced, that the men have nothing more to learn in the way of handling pieces and horses. The best drilled battery, however, will be of no use if it does not know how to shoot. With target practice the real practical instruction of the officer commences. Battery and platoon commanders must devote all their attention to the firing, and to observing the effects of the fire.

There is no time left for battery and platoon commanders to look after the little

irregularities that always take place during firing, to see whether traces are stretched limbers in line, harness in order, etc. A non-commissioned officer, preferably the first sergeant, could be detailed to look after this matter.

Ammunition is costly. The attention of a light battery commander should not for a moment be diverted during the firing. No remarks should be made, no questions asked by his subalterns, when firing at unknown distances at moving targets takes place. Any mistakes made during the firing can be discussed after each practice.

The continental armies of Europe are constantly endeavoring to place their field artillery at the highest state of efficiency.

The German field artillery has just been increased, and Germany spares neither time nor money for target practice.

There are firing grounds in different parts of the empire, and these grounds are so extensive, that practice can be had under the most favorable circumstances.

In 1866, the performance of the Prussian field artillery was not satisfactory, but in 1870 it performed its duties admirably, and could hold its place very well against infantry. This was mainly due to the thorough instruction in target practice.

General Kraft, Prince zu Hohenlohe Ingelfingen, in his *Letters on Artillery*, repeatedly praises the performance of the artillery, especially when under infantry fire.

One example only: "At the battle of St. Privat," the General relates, "a heavy mass of the enemy's infantry advanced from Amanvillers with great energy, against one of our artillery positions. Thirty pieces were in line. One trial shot was fired at 1900 yards. As the enemy came within this range, the thirty pieces gave quick fire. Heavy smoke soon enveloped the advancing enemy. The firing was stopped. In a short time the enemy reappeared on this side of the cloud of smoke, still advancing steadily. Again a trial shot was fired; this time at 1700 yards, followed by quick fire. This was repeated at 1500, 1300, 1100 and 900 yards. In spite of the terrible destruction, caused by the well directed artillery fire, these brave troops still advanced, but at 900 yards the effect of the fire was too murderous; they turned and retreated in confusion. Here we have an infantry attack which was repulsed by artillery only."

"A few years later," continues the General, "I met an adjutant of General Ladmirault, who had carried the order for this attack, and was present with it. He told me: 'Il était impossible de réussir. Vous n'avez pas d'idée qu'est ce que cela veut dire, que de devoir avancer dans le feu de votre artillerie.'"

"Speaking of another repulse of an infantry attack by artillery, the General remarks: "I did not think that the instructions acquired in target practice in time of peace, would bear such good fruit under the excitement of a battle."

Our infantry target practice is ahead of anything that I have seen in Europe. What has been done for our field artillery, to promote target practice? Very little, I believe. I speak from my own experience. I have served two details with the light battery since the close of the war. From 1869-1871, at Washington and at Fort Adams, R. I. Not a shot was fired during that time.

Again at Fort Hamilton, N. Y. H., from 1885-1887. During that time we had target practice twice, I believe. The firing was over water, but this is not the proper kind of practice for field artillery, still it is better than none at all. We have good guns, excellent horses, intelligent men. What we need is a suitable ground for target practice, a little money for ammunition, and, as Lieutenant Hawthorne remarks, a thorough system for conducting target practice, and a complete code of firing regulations."

DARMSTADT, GERMANY, October 14, 1890.

Reviews and Exchanges.

Permanent Fortification for English Engineers.*

THIS book supplies what is equivalent to a new edition, extended and brought up to date of the Lectures on Permanent Fortification forming Vol. VII. of the Occasional Papers, Royal Engineers Institute, published in 1882 and followed in 1885 by an addendum containing information to that date. It is a standard work which, while specially applicable to the system of defense favored by the Corps of Royal Engineers, should be in the hands of every engineer officer who desires to keep abreast with European progress in his profession. Major Lewis is now on duty in the office of the Inspector General of Fortifications and Engineers, who in that service is charged with duties corresponding to those of our Chief of Engineers; and the object of this publication cannot be better expressed than in the language of the author. He says: "This book is written to save engineer officers trouble. This, it is hoped, it may do in two ways; directly, by forming a book of reference for details to those stationed where works are in course of construction; and indirectly, by giving assistance in the preparation of the projects which have to be considered by those at the War Office, who would be much helped by their being drawn up in agreement with the principles and practice recognized there."

The volume is handsomely printed in octavo, and is copiously illustrated with plates and drawings, bound with the book itself. It is an eminently practical treatise, but its interest is by no means confined to officers of the same arm of service as the author. Artillery officers will find much worthy of attention in connection with the use of modern high power and rapid fire guns, and the manner in which it is proposed to serve and cover them in the new defensive works.

While the scope of the treatise includes all kinds of permanent fortification, the part which will most attract attention in this country is that devoted to coast defense. This is treated technically in detail, but there are also views expressed which have a bearing of much wider significance. With a country whose safety demands the mastery of the sea we should naturally expect the Navy to occupy a far more important position in relation to coast defense than with one which lacks distant colonies and has no extensive commercial marine. Yet Major Lewis has little confidence in floating batteries and harbor-defense ironclads for this work. As this subject is now attracting attention in this country his views possess sufficient interest to be quoted at considerable length here.

"It is an easy way out of any difficulty in projecting the defenses of a place to summon up mentally the British fleet to supply the deficiencies; or at the least, to call up the vision of a coast-defense ironclad, or of some gunboats permanently stationed at the spot; but such dreams should not be yielded to, as they cannot be realized.

"For what does the provision of a ship permanently told off to defend a particular place, and not to be removed thence, mean? It means that the admiral on the station, whose *raison d'être* and business it is to defend British commerce and British posses-

*Royal Engineers Institute. *Permanent Fortifications for English Engineers*, by Major J. F. Lewis, Royal Engineers, 1890. Published by the R. E. Institute, Chatham.

sions there, of which the port in question is a part, is permanently deprived of a portion of his fleet, which, whatever the emergency, he is not to use away from a certain fixed point, whether that point be in immediate danger or not.

"He may think that the best defense is to take the offensive, and one more ship might make the turning point in a comparison of strength between himself and the enemy, but there is this ship permanently detached, and able only to defend the one port in the one way; instead of adding to the protection of the whole station, this particular port among the rest. Of course, any admiral would at once remove such a ship from its port if he had reason to believe he could employ it advantageously elsewhere.

"In order that an admiral may not use his discretion in this way, it has actually been proposed to build ships that could not safely be removed from the places they were intended to defend. Deliberately to build bad ships is the *reductio ad absurdum* of this system.

"On the other hand, because a squadron is entrusted with the defense of a particular portion of the British possessions, such, for instance, as the West India Islands, its presence must not be counted on before every port that may be attacked by the enemy; it might be thrown off the scent, or engaged elsewhere at the time it was wanted there; consequently, every fortified place must be prepared to defend itself to the best of its ability. It will be the business of the Navy to relieve it as soon as possible.

"A place should be as complete as possible in itself, regard being had to the scale on which the defenses are being carried out; there should be no gaps left to be filled up by floating batteries or harbor defense ironclads.

"If there be a want—if, for instance, the place cannot be protected from bombardment—the admiral will know of it, and he must take his measures accordingly; but he is entitled to demand that the place should be able to hold out during his absence for a short time, dependent on the distance of the relieving force, against any attack which may be reasonably expected to be made; otherwise it is not much good fortifying the place at all.

"The necessity of being independent of naval assistance does not involve dispensing with local means. It is essential to have scouts to give warning of the approach of a hostile force, and very desirable to have armed vessels to protect traders approaching the port. These requirements can be met by arming tugs and merchant ships. Torpedo boats would be of great assistance in most places, and will often be provided; but even then they must not be counted upon as always certain to remain there."

If these views are sound in respect to a country like Great Britain, and it is generally conceded that she is well informed and alive to her own interests, how much more are they entitled to serious consideration by us before a departure is made from the policy recommended by the Board of Army and Navy officers and civilians appointed under the provisions of the Act of Congress approved March 3, 1885, to examine and report at what ports fortifications or other defenses are most urgently required, the character and kind of defenses best adapted to each, etc. The action of this Board was in accord with the views of Major Lewis on this important matter, and only exceptional use was found for coast-defense ironclads.

H. L. A.

Hand-book of Problems in Direct Fire.*

Only a few months ago we received Captain Ingalls' invaluable work entitled "Hand-book of Problems in Exterior Ballistics, Part I." Now we have to record a more extensive work by the same author. A prominent and able writer on the subject,

* *Hand-book of Problems in Direct Fire.* By Captain James M. Ingalls, First U. S. Art'y. Published by John Wiley and Sons, New York.

whose name is already mentioned with those of Siacci, Euler and others, the value of his books cannot be overestimated by the student of exterior ballistics, and by all officers, whether of Cavalry, Infantry or Artillery, since he devotes to the weapons of each fighting branch their due space.

From the beginning of the book through the 21st problem the subject matter is virtually the same as in the author's "Hand-book of Problems in Exterior Ballistics, Part I.," but he has added several new and important examples, showing how zealously he has worked to keep pace with modern progress, and in many cases, to take a step in advance, by predetermining results that have subsequently obtained both with heavy artillery and small arms.

In problem 1, there is a more extended discussion of the comparison of computed with measured velocities, calculation of penetration of wrought iron, and of striking energy in terms of metrical units.

In problem 3, he adds an important discussion on danger range, point blank firing and estimating distances.

In problem 18, he adds much new and important matter on the determination of the ballistic coefficient and initial velocity. A careful study of this problem shows some of the most valuable ballistic deductions and discussions presented anywhere in the book, containing, as it does, so much important matter upon the subject of modern small arms.

Beginning with problem 22, the author presents entirely new matter. This problem deals with the computation of Range Tables. It is handled in the happiest manner and gives a full and clear discussion of all the necessary factors which should enter, thus outlining to cavalryman, artilleryman, or infantryman the method to be pursued in supplying himself with a table, which will be an invaluable guide at the firing point. A carefully arranged "Range Table for the 8" B. L. Naval Gun for shells weighing 250 lbs." accompanies this problem.

Two appendices then follow, which, taken with the preceding matter, make this book a most complete treatise on the whole subject of "Exterior Ballistics," theoretical, problematical and practical.

Appendix I, contains deductions of general formulæ for direct fire, and Appendix 2, formulæ for mortar firing, which has of late days become such an important factor in artillery operations.

At the end of the book the author adds Tables V. and VI. to be used in the solution of problems in mortar firing.

A passing glance will not suffice to enable one to appreciate the fund of information which has been presented. The works of this author are invaluable and worthy of the most careful and diligent study. His persistent efforts, shown in his carefully prepared and complete works, place him well in the front rank among authorities on "Exterior Ballistics," and we trust his work will be studied, profited by, and appreciated as it should be.

S. R.

Strategy and Grand Tactics.*

"Strategy and Grand Tactics: Viewed from the experience of the later wars, Vol. II., by General Pierron." In this second volume General Pierron continues the subject of the *Organization of the Line of Communications* which was not finished in the first volume published three years ago.

Stratégie et Grande Tactique, d'après l'expérience des dernières guerres, par le Général Pierron, Tome II. Paris. Berger-Lerrault et Cie., 1890.

The first glance which this volume receives from the reader causes surprise on account of the great industry and research shown by the author. The vast number of topics handled and the authorities quoted give great force to the conclusions which are placed at the head of each section.

The subjects treated are: Navigable highways; Furnishing supplies by rail; Construction, repair and destruction of works; Telegraphic service; Postal Service; Hygiene and transportation of the sick and wounded; Depots and hospitals for horses; Supply stores along the line of communication. In studying these subjects General Pierron has ransacked libraries of all sorts, military biography, technical journals, official reports are put under contribution.

The arrangement of the work is excellent. Each section begins with a series of "general principles" which are a summary of the best practice of experience. To support them are given many "documents to be considered." In these we find whole chapters devoted to railway and other engineering practice in various quarters of the world. Other parts again contain data which may be studied to advantage by all persons who have to do with army transportation in any form. The signal service claims a large share of attention. The hygiene of camps, hospitals and battle-fields receive much space.

To completely review a work which studies subjects so diverse as the extrication of Banks' expedition by means of the Red River dam; the temporary repairs of bridges destroyed by the foe; the purifying of a battle-field after an action; how to supply an army with its provisions and stores, would almost require a volume in itself. Suffice it to say that no officer who aspires to the command of large bodies of troops, no officer of engineers, of the quartermaster's, subsistence or medical departments should fail to study this valuable work with the utmost care. The details of this volume may not be of so great importance to the commanders of small bodies as are those of the first volume, still, as no man can say what he may or may not have to do in war, the book should be in the hand of every officer in the Army as a valuable *aide-memoire* for service in the field.

F. A. M.

Notes on Military Hygiene.*

A little work that promises to be of much value to the line of the Army as well as those interested in seeing healthy surroundings and good physical development for the soldier, is Dr. Woodhull's syllabus of lectures on Military Hygiene.

For some years past the study of hygiene has been included in the course required at the Infantry and Cavalry School at Fort Leavenworth, Kansas, and generally one of the medical officers on duty at that post has been detailed to deliver a series of lectures on this subject. For the past four years this duty has been assigned to Dr. Woodhull, and the present compend is the result of his labor during that time. In the first section we are taught, in the simplest and most concise way, how to select the soldier; in the succeeding chapters how to take such care of him as will secure for the Government the maximum of duty.

The soldier's food, clothing and quarters are discussed; the sewage of permanent and temporary stations considered and the subjects of marches and camps gone over with sufficient detail. The book may be considered as a mass of valuable facts prepared and arranged in Dr. Woodhull's usual agreeable manner, and it should be made an honored addition to the desk of every line officer of the Army.

W. E. H.

* *Notes on Military Hygiene.* By Alfred A. Woodhull, Major Medical Department, Bvt.-Lieut.-Col. U. S. Army.

A Course of Instruction for Non-Commissioned Officers.*

Lieutenant Carbaugh, in the preface of this work, states its object to be to present in one volume those subjects with which a non-commissioned officer should be familiar in order to be able to efficiently perform his military duties.

The book, except the last thirty-six pages, is especially adapted for non-commissioned officers of artillery, the subjects therein treated being those generally used by non-commissioned officers of that arm of the service and very rarely by others. Had the volume been limited to the instruction of artillery non-commissioned officers, it would have given them a very complete course upon some of their specialties and a little of field reconnaissance and kindred subjects useful to all non-commissioned officers; but too much has been condensed into the last few pages and too much omitted to make it as useful as it should be for cavalry and infantry soldiers to warrant its title. In fact, a volume of equal size would be necessary to cover essential instruction in reconnoitring, outpost duty, camping, packing, construction of kitchens and latrines, water supply and its preservation.

G. H.

Campaigning with Crook.†

In "Campaigning with Crook," Captain King tells in his most charming style the story of one of the most remarkable campaigns of American Indian warfare.

The book is full of interest, and is in itself a tribute to the daring and sagacity of the leader of the expedition no more than to the pluck, bravery and endurance of his followers.

Looking back from this date it seems a somewhat remarkable fact that while the salient point of the disaster of the Little Big Horn still remains in the popular memory, so little should have been heard of the Sioux campaign of 1876, of which that fight was the tragic incident; but it is gratifying to know that part compensation has been made in the fact that the story of courage, privation and suffering has, within the past year, been told by two able pens.

To Captain King's account are added several short stories of garrison life that will be enjoyed by that popular author's admirers.

E. M. L.

On the Determination of the Strength of Various High Explosives.‡

This paper was suggested to the author during a series of experiments undertaken some months ago for the purpose of reconciling apparently great inconsistencies with regard to the relative strengths claimed for various newly invented or patented explosives. The great facility with which an explosive can be invented, and the attraction that work of this character possesses for investigators, both great and small, may explain, in a measure, the annual outpour of so called new explosives. Presuming upon the ignorance or lack of scientific knowledge on the part of the practical miner, the most extravagant and misleading claims are made for the majority of these powers, not the least significant of which is that all are equally as strong as, and many of them much more powerful than liquid nitro-glycerine. It was in order to verify or disprove this particular claim that the experiments were undertaken, especially as strenuous

* *A Course of Instruction for Non-Commissioned Officers.* By Captain Harvey C. Carbaugh, A. J. A., 1st Lieutenant 5th Artillery.

† *Campaigning with Crook.* By Capt. Charles King, U. S. Army. Harper Brothers, Publishers.

‡ *On the Determination of the Strength of Various High Explosives.* By Lieut. Willoughby Walke, 2d Artillery. Instructor in charge of U. S. Artillery School Laboratory, Fort Monroe. *Journal of the American Chemical Society.*

efforts have been made by some of the inventors to have their powders adopted for military and naval purposes.

The first step in the work at hand was to provide apparatus for accurately registering the effects of the various explosives. The limited facilities at the author's disposal left little latitude of choice.

Several methods have been devised for the purpose of testing the strength of explosives, but as yet none can be said to give perfect satisfaction. All of them are approximations, nor do the inventors claim more for them. Even the *crusher* used by Berthelot in his elaborate investigations in this direction gave only approximate results, as demonstrated by MM. Sarau and Vieille.

The majority of the methods pursued seek to determine merely the comparative strength of the explosives, some one explosive being selected as the standard with which all others are compared. It still remains to institute an accurate, absolute scale, by which the strength of explosives may be measured.

After due consideration, it was decided to use the Quinan pressure gauge, both on account of the degree of accuracy with which it registers the pressures developed by the explosives, or rather "by the gases resulting from the decomposition of the explosives," and the ease with which the apparatus is manipulated.

Twenty-seven explosives in all being tried, the results were compared with those obtained with a sample of nitro-glycerine, the strength of which was assumed as 100. The results placed explosive gelatine and hellhoffite first, with a strength of 106.67. Gun-cotton and dynamite had each a strength of over 80; emmensite one of 77.86; bellite 65.7; and melenite, the famous French explosive, which is not nearly so safe to handle as bellite, had a strength of only 50.82.

These figures are, of course, not absolute, but they give a good idea of the order in which the various explosives should be arranged as to relative strength. J. C. B.

On The War Path.*

In "On The War Path," the author, Major J. O. Kerby, late U. S. Volunteers, is supposed to be conducting an imaginary party of tourists over the battle-fields of some of the important campaigns of the late war, giving them the benefit of his knowledge of the surrounding country, and his recollections of former visits to those historic spots under other and different circumstances.

There is much of interest and real historic value in the volume, though the numerous aimless digressions from the line of his narrative, the introduction of a large amount of personal matter of interest only to those immediately concerned, and the numberless references to and comments upon a former work from the same pen, leads his readers readily to believe the first statement of the preface: that the author "does not write books for a living."

A sad commentary upon the ideas of honor too often held by those whose vocations call them to national capitals or other political centres is furnished by an early chapter of the book. The author describes his engaging himself to a prominent financier in the capacity of confidential secretary, and then, basing his actions upon the high plane of patriotism, holds himself up to the commendation and even laudation of his readers for secretly betraying some of the important matters entrusted to him, though still continuing in his position of trust, and drawing the handsome salary that only a faithful performance of his duties could have earned.

The later pages of the book will doubtless prove of more interest to the student of American History, and one is struck, in several instances, with the impartiality with which, in disputed points, the author presents both side of the story. E. M. L.

* *On The War Path.* By Major J. O. Kerby, late U. S. Volunteers.

Biographical Register.*

General Cullum, in the preface to the first edition of his "Register," after introducing his work to his brother graduates of the Military Academy as being the work of many years of persevering toil, says:

"Every source of information, official and private, has been exhausted to make this work accurate and complete. Archives have been ransacked, tons of manuscript examined, letters by thousands written, and interrogatories almost countless put wherever a hope of gleaning any information at all reliable existed. * * * With free access to the records of the War Department and Military Academy, a voluminous correspondence with graduates and their friends, and a personal acquaintance of more than thirty years with the movements and operations of the Army, I have, by untiring industry, collected and condensed in these volumes as faithful summaries of the services of the *élèves* of the Military Academy as I believe any single individual could accomplish. To avoid errors as far as practicable the *état de service* of each living, loyal graduate was submitted to him for correction before being incorporated in this work."

The second edition of this "Register," published twelve years later, contains some corrections; although, as it was necessary to make these corrections in the plates, some minor facts were necessarily omitted.

The third edition, now in press for early publication this season, is printed from entirely new plates. Thus all errors of previous editions are corrected, and it also brings the work up to date, adding biographical sketches of over one hundred distinguished graduates. These military and civil histories of graduates are brought together in such a way that the sketch of each individual is given entire in one place and stands complete to date. The arrangement is singularly convenient, systematic and happy, and the result forms a new illustration of the claims of the Institution which General Cullum so ably defends.

Practical Information for Non-commissioned Officers on Field Duty.†

Colonel Henry, in the little pamphlet which he has compiled for the benefit of the non-commissioned officers of the Army, has given information that should be known to every non-commissioned officer. How much of it is even now generally known, we leave to the opinion of those having experience in such matters. That there is need for such works and that their production is a healthy sign cannot be doubted.

The future non-commissioned officer must be a differently educated and trained man from his brother of the past, and in our own service at least should have a much better position and better pay, if we are to attain to that state of discipline and control which the conditions of modern warfare require.

While much difference of opinion appears as to the form of tactical development which will result from new inventions, all agree in the idea that greater and greater responsibility will fall to the lot of the sub-leaders and that greater judgment, greater knowledge and higher personal qualities must be theirs if the result of future struggles is to bring the hoped for success. To this end such works as that of Colonel Henry

* *Biographical Register of the officers and graduates of the United States Military Academy from its establishment, March 16, 1802, to the present time.* By Bvt. Major-General George W. Cullum, Colonel of Engineers, U. S. Army, retired. Third edition, from new plates. In three large octavo volumes. Houghton, Mifflin & Company.

† *Practical Information for Non-commissioned Officers on Field Duty.* By Bvt. Colonel Guy V. Henry, U. S. Army.

are devoted, and the more they contain the past practical experience of our own officers in certain regards, the better. For while new inventions may alter certain conditions that may be denominated mechanical, they do not alter others, which while better learned perhaps in camp and on the march, can, in part at least, be acquired from the record of past experience.

Our own war has produced too little in the way of recording such experience. Plenty of "strategy" has been manufactured and much controversy aroused concerning construction and misconstruction of various matters, but too little by far has been recorded of practical methods used and experience gained which might serve as guides in a future struggle if ever our country should be subject to invasion.

We fear that the zeal of an inspector of target practice had gotten the upper hand when our author declared "that rifle practice is now admitted to be the most important part of the soldier's instruction," and believe that other knowledge may be found of at least equal importance. General Lung, in a recent work, declares that the infantryman is selected and instructed with a view to firing, to marching and knowledge of ground. Those who sympathize with the views of the author of "Modern Bobadilism" will certainly differ from Colonel Henry and will believe that a truer criterion of soldierly worth should include other qualities than those of the pot-shot, and to an equal degree. We could wish also that Colonel Henry had devoted more space to that most important but sadly neglected study—appreciation of ground.

The booklet is a good one and we hope will impel others to effort, till at last a work is produced giving full information adapted to our own needs and bearing the impress of authority.

J. C. B.

The Guardsman.

The Guardsman, a monthly journal published in Chicago and devoted to the interests of the National Guard, has passed by purchase into the possession of Lieut.-Col. Henry L. Turner, 1st Regiment of Infantry, I. N. G.

The first issue, under Colonel Turner's management, is an excellently printed and interesting paper, full of matter of value to the National Guard and to those interested in its welfare.

The publisher's announcement declares that it will be the aim of *The Guardsman* to labor for greater efficiency in the Guard; that it will strive to do its part in lifting up and dignifying the service, and to promote closer comradeship and a more perfect unification between the Guard in different sections of the country, and between the Guard and the Regular Army—a most laudable purpose certainly, and one that should be in every way encouraged.

J. C. B.

ARTICLES ACCEPTED FOR THE JOURNAL.

- Musketry.* - - - - By Capt. JAMES CHESTER, 3d Artillery, U. S. A.
Our Experience in Artillery Administration. By Gen. HENRY J. HUNT, U. S. A.
Military Gymnastics. - - By Capt. M. C. FOOTE, 9th Infantry, U. S. A.
The Power of the Senate. - - - - By Gen. J. B. FRY, U. S. A.
Smokeless Powder. Translated from the French and abridged by Capt. F. A. MAHAN,
 U. S. Engineer Corps.
The Young "Giant in the Spiked Helm" takes the Oath. By Gen. S. W. CRAWFORD,
 U. S. A.
On the Increase of the Number of Cadets at the Military Academy. By Prof. P. S.
 MICHIE, U. S. Military Academy.

FOR REVIEW.

- On the War Path.* A Journey over the Historic Grounds of the late Civil War.
 By Major J. O. Kirby, Chicago: Donohue, Henneberry & Co. 1890.
Permanent Fortification for English Engineers. By Major J. F. Lewis, Royal Engi-
 neers. 1890.
Little Jarvis. By Mally Elliot Seawell. New York: D. Appleton & Co. 1890.

OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

ARGENTINE REPUBLIC.

- Boletin del Centro Naval.* (June, July, August and September, 1890.)
Revista Cientifico-Militar. (July and August, 1890.)
Revista de la Union Militar. (September and October, 1890.)

ENGLAND.

- Proceedings of the Royal Artillery Institution.* (September, 1890) The Marshals of
 France. Notes on the Handling of Artillery in the Field with Especial Regard
 to the Supply of Ammunition. Control of Artillery Fire in Action. (November)
 Ranging a Battery.
The Illustrated Naval and Military Magazine. (October, 1890) Great Commanders
 of Modern Times. Wellington. In the Cavalry Ranks; or, Why not Enlist as
 a Soldier? Some Notes on Military Topography. The Fight of the "Dolphin."
 (November) The Vale of Cashmere. Six Months with a Russian Family. A
 Wonderful Exploit. Todleben. Coast Defense and Naval Responsibility. The
 Garrison Hack.
Journal of the Royal United Service Institution. (No. 153) The Drill and Train-
 ing of Volunteer Infantry. Infantry Training. The Sanitation of Barracks.
 Notes on the Defense of a Modern Fortress. Cavalry Equipment. Organization
 and Distribution. Naval Warfare. The Draught of Military Carriages.

The United Service Magazine. (October, 1890.) The Anti-Slavery Congress. The Shannon and the Chesapeake. The Cavalry Revival—A Plea for Infantry. Captain Pyeshkoff's Ride. The Army Veterinary Service. Waterloo.—Conclusion. (November.) Gerrymandering in Africa. The Navy and the Colonies. The Interior Economy of the Armies of Napoleon. The War Training of the Navy. Gordon's Death.—What is the Truth? Tactical Guides for the Formation and Leading of the Cavalry Division. Languages in the Service.

FRANCE.

Revue Militaire de L'Étranger. Garrison Service in Germany. General Wolseley's Ideas on the English Army. The Military Constitution of Roumania. The Horse Conscription in Germany. The Military Forces of Sweden. The Influence of Smokeless Powder on Tactics. Field Works in the German Army. The New Equipment of the Dutch Infantry.

Revue du Cercle Militaire. Recent Progress in European Navies. Musketry-fire in the Field. The Manœuvres of the 9th German Army Corps.

L'Progress Militaire. The Future of the French Artillery. The Manœuvres of the 18th French Army Corps. The French Manœuvres of 1890. The Cavalry in the Grand Manœuvres. Dismounted Fighting.

INDIA.

Journal of the United Service Institution of India, Vol. 29, No. 82. Personal Recollections of the Afghan Campaigns of 1878-79-80. Notes on Judging Distance Practice in the Native Army. The French System for Targets and Targets for the French System. Entrenchments—The Attack. On the Influence of the New Technical Military Inventions on Modern War.

ITALY.

Rivista di Artiglieria e Genio. (Sept. and Oct., 1890.)

SPAIN,

Memorial de Artilleria. (Sept. and Oct., 1890.)

UNITED STATES.

The Century. (Nov. 1890) Lincoln and his Son "Tad." Life in the White House in the Time of Lincoln. Early Victories of the American Navy. General Lee and the "Yankee in Andersonville." "The Builders of the First Monitor." The Flag First Hoisted at Mobile. A Letter from Lincoln when in Congress. Horace Greeley at Lincoln's First Nomination.

The North American Review. (Nov., 1890) What Congress has done. Relief for the Supreme Court. Business Men in Politics. Reminiscences of a Portrait Painter. The London Police. (December) Partisanship and the Census. The Future of Warfare. The Partition of Africa. Dr. Koch's Discovery.

The Popular Science Monthly. (November, 1890) The Relations of Men of Science to the General Public. The History of a Star. Some Lessons from Barbarism. The Use of Alcohol in Medicine. School Life in Relation to Growth and Health. (December) The Identity of Light and Electricity. The Experiences of a Diver. Architecture and the Environment.

Harper's Monthly Magazine. (November, 1890) A Winter Journey to Japan. Urban and Commercial Chili. Switzerland and the Swiss. Princeton University. Our Italy. (December) The Winter of our Content. A Christmas Present. Flute and Violin.

The Railroad and Engineering Journal. (November, 1890) The Thames River Bridge. Aerial Navigation. United States Naval Progress. The Development of Armor. Foreign Naval Notes.

Magazine of American History. (November, 1890) Characteristic Order of General Winfield Scott. The Action at Tarrytown, 1781. Revolutionary Newburgh. The Puritan Birthright.

The United Service. (November, 1890) The Naval Attack upon Charleston, South Carolina. A Military Meditation. General Albert Sidney Johnston. Napoleon. IV. The Trials of Staff Officers. (December) The Career of an Enterprising Confederate Gunboat. Napoleon.—Conclusion. Epithets and Conundrums of the Sea. Who Comes There?

Transactions of the Technical Society of the Pacific Coast. (May, July, 1890)

Transactions of the American Society of Civil Engineers. (September, 1890) The Cheapest Railroad in the World. Littoral Movements of the New Jersey Coast.

Journal of the U. S. Cavalry Association. (Sept., 1890) With the Reserve Brigade. A Reconnaissance with the First Maine Cavalry. Kilpatrick's Raid Around Atlanta. A New Lecture on the Horse's Foot. An Unexampled Ride. New Drill Regulations for Cavalry, U. S. Army.

The Pacific National Guardsman. (Sept. 1890) Some Lessons of a Day of Field Manœuvres. Movements of Troops in Cities in Cases of Riot. History of California Volunteers. The Battle of Los Angeles. Cadets and Corsets at West Point. Napoleon and his Military System.

Bulletin of the American Geographical Society. (Sept., 1890) Canada: The Land of Waterways. Modern Iceland. Some Notes on the Upper Amazon.

Monthly Weather Review (To date).

Publications of Department of Agriculture (To date).

Science (To date).

The Army and Navy Register (To date).

Philadelphia Weekly Times (To date).

The Boston Courier (To date).

Home and Country (To date).

Kansas City Times (To date).

Table Talk (To date).

The Electrical World (To date).

The New York Critic (To date).

Pharmacology of the Newer Materia Medica (To date).

Johns Hopkins University Publications (To date).

The 7th Regiment Gazette (N. Y.) (To date).

St. Nicholas (To date).

Announcements.

I.

AT a meeting of the Executive Council of the Military Service Institution, held on the 14th day of November, 1890, the several reports of the members of the Board of Award on the prize essay for 1890 were read in presence of the Council, and it was found that the essay signed "Certum pete finem—99" was entitled to the prize, and that the Board had not agreed to recommend any other essay for honorable mention.

Upon opening the envelope endorsed "Certum pete finem—99" the prize essayist was found to be Lieut. GEORGE W. READ, 5th Cavalry, who thereupon became entitled to the prize medal of the Institution together with a certificate of life membership.

* * * * *

At the same meeting a committee was appointed for the purpose of taking into consideration the subject of the biennial election to take place in January, 1891, with instructions to furnish to the members of the Institution information as to the places to be filled, the branches of the service not represented on the Council, and the members available to fill these vacancies.

The proposition to reduce the entrance fee of the Military Service Institution to \$3 was also referred to this committee that it might be placed before the members of the Institution to be voted upon at the time of the election.*

* The report of this Committee has been sent to each member of the Military Service Institution.

II.

At a meeting of the Publication Committee of the Military Service Institution on the 20th day of November, 1890, the following communication was received:

THE MILITARY SERVICE INSTITUTION }
OF THE UNITED STATES. }

GOVERNOR'S ISLAND, N. Y. H., Nov. 20, 1890.

TO GEN. H. L. ABBOT, U. S. A.,

Chairman Publication Committee

Military Service Institution.

GENERAL:

Upon the completion of the eleventh volume of the JOURNAL OF THE MILITARY SERVICE INSTITUTION, I hereby tender my resignation as its editor and as officer in charge of publication, retaining my editorial connection with the production of the "Historical Sketches, U. S. A."

Other responsibilities render it necessary thus to relinquish one of the duties continuously performed by me during the last twelve years.

I shall not relax my efforts, in other ways, to promote the best interests of the Institution. Very respectfully,

T. F. RODENBOUGH,

Bt. Brig.-Gen. U. S. A.

The Committee accepted with regret the resignation by General Rodenbough of his position as editor of the JOURNAL, and designated Colonel Hughes to draft and lay before the Committee at its next meeting a suitable resolution expressing the Committee's appreciation of the value of General Rodenbough's services as editor of the JOURNAL during the last twelve years, and their regret at being obliged to sever relations of such long standing.

The Committee then elected Major WILLIAM L. HASKIN, 1st Artillery, to fill the vacancy caused by the resignation of General Rodenbough.

* * * * *

General Rodenbough's resignation was duly forwarded to the President of the Military Service Institution, who acknowledged its receipt in a letter which so gracefully and well expresses the sentiments of the Institution at large in regard to the loss it has sustained, that General Rodenbough's successor asked for and obtained permission to enter it in the JOURNAL.

ANNOUNCEMENTS.

WASHINGTON, D. C., November 23, 1890.

BREVET BRIGADIER-GENERAL RODENBOUGH,

Military Service Institution, New York City.

DEAR GENERAL :

I believe I only express the universal sentiment of the Military Service Institution in assuring you of my regret that you have found it necessary to resign from the position as editor of the JOURNAL of the Institution which you have so long, so ably and so faithfully fulfilled.

Of course all must admit that you have discharged your full duty to the Institution in that regard and left us no other course but to accede, though reluctantly, to your request to be relieved from further obligations in that connection.

I am gratified that you will still retain your duties in connection with the "Historical Sketches," now in course of printing. Very respectfully and truly yours,

J. M. SCHOFIELD,

Major-General U. S. A.

and President Mil. Ser. Inst.



MILITARY AMMUNITION

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(Sola)

MOSQUERA'S FOOD PRODUCTS

BEEF-MEAL AND BEEF-CACAO.

Concentrated, Predigested, Assimilable, Palatable, Economical.

The question of replacing the waste of tissue where normal nutrition is inefficient by means of concentrated or predigested foods is one that has always presented many difficulties, there being very few preparations, if any, that meet all requirements of the medical profession.

* * * * *

The ordinary process of preparing meat extracts involves a simple extraction of the meat with either warm or cold water. This extract contains none of the nourishing, flesh-forming, albuminous substances. The meat juices are merely cold extractions of the meat. They possess very little nutritive value.

Powdered meats at heretofore known, are nothing more than the residue left after drying the meat. They are liable to become rancid. They are lacking in the organic salts peculiar to meat, which salts are essential to the digestive process. Powdered beef, moreover, requires as much effort to digest it as does ordinary beef, and can not therefore be regarded as an adequate food for patients with derangement or weakness of the digestive organs.

Another group of meat preparations embraces the meat peptones. The taste of which are more or less bitter and objectionable to the palate, so that patients either absolutely refuse them or take them with the greatest repugnance. Besides, their price is so high that the physician is often obliged to abstain from prescribing them.

* * * * *

All the difficulties characterizing the foods mentioned have been overcome by the new food products of the Mosquera-Julia Food Company.

Mosquera's Beef Meal contains all the inorganic salts and stimulating principles of the extracts of meat, and, in addition, the nutritive principles which the extracts lack; all the albumen of meat juices without their weakness; all the extracts of powdered meats without their rancidity or insolubility; all the peptone of peptonized meats without their bitterness.

Mosquera's Beef Meal is a perfectly pure predigested meat, containing all the nutritious constituents of lean beef, half of which are in a soluble form ready for assimilation; the other half easily digestible by the gastric or pancreatic juices. The entire preparation is composed of nutritive matter, containing about 40 per cent. of soluble peptone and albumose.

Mosquera's Beef Meal represents in actual nutritive value at least six times its weight of lean beef. It is perfectly palatable and will be tolerated with ease by the most delicate stomachs. It admits of being administered in a variety of forms, thus avoiding monotony in food.

It may be given in any thick soup, condimented to suit the taste of the patient, or also mixed with biscuit powder, oatmeal, porridge and milk and sugar. Again, it may be mixed with chocolate, which makes a delicious beverage, or given in the form of a sandwich, and finally, as a plain beef tea, simply dissolving it in hot water, adding salt.

* * * * *

Mosquera's Beef-Cacao consists of equal parts of beef meal, sugar and a superior article of Dutch cacao. It does not require cooking, but may be mixed with warm milk exactly like ordinary chocolate, and so completely is the taste of the beef disguised that it can not be detected. Requiring therefore no previous preparation it is most conveniently administered.

We have only decided to accept the agency of these products after a very thorough investigation, and we will at all times be responsible for their quality.

To physicians a pamphlet fully descriptive of the special advantages, uses, and methods of administration of these preparations will be mailed on request, and samples will be sent to physicians who desire to clinically test these preparations in practice.

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Historical Sketches of the Army.

THE following named officers have volunteered, or have been designated, to prepare Historical Sketches of their Corps or Regiments for publication in this JOURNAL.

<i>Medical Department</i>	SURGEON CHAS. SMART,
<i>Pay Department</i>	MAJOR A. B. CAREY.
<i>Signal Corps</i>	LIEUT. WM. A. GLASSFORD.
<i>1st Cavalry</i>	LIEUT. R. P. P. WAINWRIGHT.
<i>2d Cavalry</i>	MAJOR A. E. BATES.
<i>3d Cavalry</i>	LIEUT. THOS. B. DUGAN.
<i>5th Cavalry</i>	LIEUT. EBEN SWIFT.
<i>6th Cavalry</i>	LIEUT. F. G. HODGSON.
<i>7th Cavalry</i>	LIEUT. E. A. GARLINGTON.
<i>8th Cavalry</i>	LIEUT. C. M. O'CONNOR.
<i>10th Cavalry</i>	LIEUT. JOHN BIGELOW, JR.
<i>1st Artillery</i>	COLONEL L. L. LANGDON.
<i>2d Artillery</i>	LIEUT. W. A. SIMPSON.
<i>4th Artillery</i>	LIEUT. A. B. DYER.
<i>2d Infantry</i>	GEN. FRANK WHEATON.
<i>3d Infantry</i>	CAPT. WM. GERLACH.
<i>4th Infantry</i>	LIEUT. JAS. A. LEYDEN.
<i>6th Infantry</i>	LIEUT. CHAS. BYRNE.
<i>7th Infantry</i>	LIEUT. A. B. JOHNSON.
<i>8th Infantry</i>	LIEUT. W. P. RICHARDSON.
<i>9th Infantry</i>	LIEUT. E. B. ROBERTSON.
<i>10th Infantry</i> ..	LIEUT. S. Y. SEYBURN.
<i>11th Infantry</i>	LIEUT. R. C. J. IRVINE.
<i>12th Infantry</i>	LIEUT. CHAS. W. ABBOT, JR.
<i>13th Infantry</i>	LIEUT. M. J. O'BRIEN.

- 14th Infantry*.....COLONEL T. M. ANDERSON.
15th Infantry.....LIEUTS. G. K. MCGUNNEGLE and G. A. CORNISH.
16th Infantry.....CAPT. WM. V. RICHARDS.
17th InfantryLIEUT. GEORGE RUHLEN.
18th Infantry.....COLONEL H. M. LAZELLE.
19th Infantry.....LIEUT. C. C. HEWITT.
20th Infantry.....CAPT. J. N. COE,
21st Infantry.....COLONEL H. A. MORROW.
22d Infantry.....CAPT. O. M. SMITH, C. S.
24th Infantry.....LIEUT. H. W. HOVEY.

EIGHTH REGIMENT OF CAVALRY.

By LIEUT. CHARLES M. O'CONNOR, U. S. A.,

ADJUTANT EIGHTH CAVALRY.

THE Eighth Cavalry, organized in 1866, is one of the four cavalry regiments by which the military peace establishment was increased under an Act of Congress of July 28th of that year.

By G. O. No. 92, A. G. O., 1866, the field officers who had accepted appointments were Colonel John I. Gregg, Lieut.-Colonel Thomas C. Devin, Majors William Gamble and William R. Price. Colonel Gregg joined for duty at Camp Whipple, Arizona, in December, 1866, assuming command of the regiment and the District of Prescott, Arizona,—Lieut.-Colonel Devin and Major Price in January 1867,—Major Gamble never joined.

The first troop, A, was organized at the Presidio of San Francisco, September 19, 1866, 1st Lieut. James H. Lord, 2d Artillery, being assigned to command. Troop B, 85 men, at the same place October 23, 1866; 2d Lieut. S. A. Porter, 14th Infantry, assigned to command. Troops C, D, E, F, G and H, 49 and 50 men each, at Angel Island, California, October 27, 1866, with officers assigned to command as follows:

C, 1st Lieut. R. I. Eskridge, 14th Infantry; D, 1st Lieut. O. I. Converse, 14th Infantry; E, 1st Lieut. I. H. Gallagher, 14th Infantry; F, 1st Lieut. C. B. Western, 14th Infantry; G, 2d Lieut. C. Gillott, 2d Artillery; H, 2d Lieut. Louis R. Stille, 14th Infantry.

Troop I, 84 men, was organized at the Presidio of San Francisco, November 12, 1866, 2d Lieut. J. E. Eastman, 2d Artillery, assigned to command.

"Troop K, 85 men at the Presidio, December 1, 1866, 2d Lieut. Greenleaf Cilley, 1st Cavalry, assigned to command.

These troops were composed chiefly of men enlisted on the Pacific Coast, and included many of the class styled "Forty-niners"; men who had passed months or years in the mines and were typical specimens of the roving order of citizens. Many of them were wild characters who enlisted in the same spirit of adventure which led them to the frontier, and who could not generally adapt themselves to the restraints of a military life. Many desertions occurred; the percentage to the end of the year 1867, being 41.8,

Troops L and M were organized February 1, 1867, at Angel Island, California; Captain E. V. Sumner and 1st Lieut. W. R. Parnell, 1st Cavalry, being assigned to command respectively.

The early part of the year 1867, found the troops at stations which they were to occupy for some time, viz.:

Headquarters, Camp Whipple, A. T., Colonel John I. Gregg, 8th Cavalry, commanding regiment and District of Prescott, A. T.

Troop A, Camp Winfield Scott, Nevada; Captain Murray Davis, 8th Cavalry, commanding.

Troop B, Camp Cadiz, California; 1st Lieut. Charles Hobart, 8th Cavalry, commanding, a detachment of 20 men being stationed at Rock Springs.

Troop C, Fort Vancouver, Washington Territory; Captain William Kelly, 8th Cavalry, commanding.

Troop D, Fort Walla Walla, Washington Territory; 1st Lieut. O. J. Converse, 14th Infantry, commanding.

Troop E, Fort Lapwai, Idaho; 1st Lieut. J. H. Gallagher, 14th Infantry, commanding.

Troop F, Camp Logan, Oregon; 1st Lieut. C. B. Western, 14th Infantry, commanding.

Troop G, Camp Reading, California; Captain R. H. Chapin, 8th Cavalry, commanding.

Troop H, Benicia Barracks, California; 2d Lieut. William K. Owen, 32d Infantry, commanding.

Troop I, Benicia Barracks, California; 2d Lieut. J. E. Eastman, 2d Artillery, commanding.

Troop K, Benicia Barracks, California; 2d Lieut. Greenleaf Cilley, 1st Cavalry, commanding.

Troop L, Benicia Barracks, California; Captain E. V. Sumner, 1st Cavalry, commanding.

Troop M, Benicia Barracks, California; 1st Lieut. W. R. Parnell, 1st Cavalry, commanding.

During the year 1867, Troop B, I, K and L, had been sent to posts in Arizona, and the troops of the regiment remained separated at posts in Oregon, Nevada, Idaho, California, and Arizona, until 1870, when ordered to New Mexico.

The officers assigned to the regiment were all veterans of the War of the Rebellion, and came to duty with the experience which that involved.

During December, 1867, and January, 1868, the headquarters was *en route* from Camp Whipple, Arizona, to Churchill Barracks, Nevada, which became the headquarters of the District of Nevada, Colonel Gregg commanding. In May, headquarters was moved to Camp Halleck, Nevada, where it remained till May 5, 1870, when it was moved to Fort Union, New Mexico, by rail, *via* Cheyenne and St. Louis, Mo. The several troops took stations at Forts Union, Craig, Selden, Wingate, Bascom, Stanton, in New Mexico, and Fort Garland, in Colorado Territory. The duties during this period were of almost continuous field service by troops or detachments, scouting after Indian depredators, furnishing guards, escorts, etc. Some of the details of service performed will be given under the headings of the different troops.

The regiment remained in New Mexico, then far beyond railroad communications, performing the same duties till July, 1875, when it marched to Texas by battalion, headquarters taking station at Fort Clark, Texas, January 8, 1876. During the period between 1875 and 1888, the regiment

remained in Texas, troops at different times being stationed at posts and camps from Fort Brown, near the mouth of the Rio Grande, to Fort Hancock, near El Paso. In May of the latter year the regiment was concentrated at Fort Concho, Texas, and made a march to Dakota, arriving at Fort Meade, Regimental Headquarters, September 3d, having made a continuous march of 1800 miles, while some of the troops in reaching their stations marched over 2000 miles. To give a complete account of the scouts and marches of each troop, which would be necessary to a full history of the regiment, would be a mere repetition of details, so that only the most important will be noted.

TROOP A.—Lieutenant Lafferty with 14 men, while scouting country in vicinity of Camp Winfield Scott, Nevada, engaged a band of Indians on January 17, 1867, at Eden Valley, Nevada, killing two and destroying their rancheria and a large quantity of provisions. One enlisted man was wounded. The same party on February 11th encountered at Independence Valley another band of Indians, killing six.

On the 29th of April, 1868, Lieut. Pendleton Hunter, with Sergeant Kelly and Privates Reed and Ward, while in pursuit of Indian horse thieves, were attacked in a cañon on the east side of Paradise Valley, Nevada, by seventeen Indians. All their horses were killed; Lieutenant Hunter was shot through the thigh and wrist, and Sergeant Kelly and Private Ward was so severely wounded that they died soon after. Lieutenant Hunter, with a detachment of 14 men, on the 30th of October, 1870, captured 9 Indians and 4 ponies in the Guadalupe Mountains, Arizona.

Captain Wells and Lieutenant Sprole, with a detachment of 9 men, surprised an Indian camp, capturing 18 bucks, squaws, and pappooses; 14 ponies, 2 guns, a large quantity of bows, arrows and camp equipage, and destroying their wicky-ups.

On November 30, 1877, Captain Wells and Lieutenant Phelps, with Companies A and K, under command of Captain Young, crossed the Rio Grande River and engaged a band of Mescalero Apaches in the Sierra Carmel Mountains, Mexico, under Chief Alsota. Two Indians were killed and three wounded, and their camp equipage was destroyed. Twenty-two horses, five mules and one burro were captured. Sergeant Wilson, Troop K, was wounded.

The ten years from 1877 to 1887 were spent at stations along the Rio Grande River at Forts Clark, Duncan, McIntosh and Ringgold Barracks, with frequent scouts after cattle thieves and smugglers. In 1887 the troop marched to Fort Davis, Texas, and in the summer of 1888 to Fort Meade, Dakota.

TROOP B.—The troop, in conjunction with Troop I, 8th Cavalry, engaged a band of Apaches on the 16th and 17th of April, 1867, in the Black Mountains of Arizona; in which encounter George W. Drummond, saddler, was killed. Several Indians were killed and wounded.

Lieutenants Carrick, Somerby and Curtis, with Troop B and detachment of Troop L, engaged a band of Hualapais Indians on May 18, 1868, on the Rio Solinas, Arizona, killing six and destroying their provisions and rancheria. On the 22d of August, 1868, the troop, under command of

Lieutenant Somerby, while scouting in the vicinity of Santa Maria River, Arizona, encountered a band of Indians, killing two and capturing one.

Lieutenant Somerby, with a detachment of 17 men, encountered a band of Hualapais Indians, September 9, 1868, killing 2 and capturing 4 squaws. On the following day he surprised a party of 10 Indians, killing 4 bucks and capturing 3 squaws. A large quantity of provisions and camp equipage was destroyed. On the 11th, the same detachment, attacked a band of Hualapais Indians, killing 5 and destroying a quantity of provisions and camp equipage. On the 13th, with 10 men, Lieutenant Somerby surprised a band of Tonto Apaches near the mouth of the Dragoon Fork of the Verde River, killed 2 Indians, and captured a rifle and provisions. Private Charles Gardner was wounded.

On the 9th of November, 1868, a detachment of Troop B with detachment of Troop L, under Lieutenant Wells, attacked a band of Apaches, killing 11 warriors and destroying a large quantity of stores.

Captain Wade, while scouting with the troop in the "Bill William" Mountains, encountered a band of Indians, killed 2, wounded 1, and destroyed 20 lodges with a large quantity of stores.

The troop, under command of Lieutenant Somerby, on the 25th of August, 1869, surprised a band of 40 Indians on Date Creek and succeeded in killing 9 and wounding 7. On the 5th of September they captured and killed 3 Indians.

TROOP C.—On the 5th of April, 1868, while scouting on the middle fork of the Malheur River, Oregon, Captain Kelly, with 48 men of the troop, charged an Indian camp of 4 lodges, killing 12 warriors, capturing 3 head of cattle, and 1 horse, and destroying 5000 pounds of dried beef. On the 11th of June the troop, in conjunction with troop F, brought in 138 surrendered Indians.

The troop, under command of Captain Kelly (Lieutenant McCleave and 57 men), while scouting in the vicinity of Camp McDowell, Arizona, on June 3, 1869, surprised and destroyed an Indian rancheria, and the following day, overtaking the Indians, killed several, captured some horses and mules, and destroyed a large number of bows and arrows. On the 6th of July, 1869, Lieutenant McCleave, with a detachment of 17 men at Hacquahalla, was attacked by a large body of Indians. After a severe engagement the Indians were driven back with a loss of seven of their number killed and ten wounded. Private James Howell was mortally wounded. A short time previous to the attack 3 Indians were discovered on the trail leading to the above water and were killed.

Captain Kelly with 21 men, in pursuit of some Indians who had stolen horses and mules from citizens at Silver City, overtook the marauders in the Chiricahua Mountains on February 12, 1871, a severe engagement ensued, and the command succeeded in killing 14 Indians and capturing and destroying a large quantity of provisions. The stolen stock (except what was killed during the fight) was recovered.

Captain Kelly and his men were specially commended by the department commander (General Pope) in General Orders, for "the gallantry and perseverance displayed by them in the recent pursuit and encounter with

a band of Apaches who had stolen a number of horses and mules from citizens in the vicinity of Silver City, New Mexico."

Captain Chilson, with 10 men, left Fort Selden on June 9, 1873, and after four days and four nights riding, overtook and engaged a party of Indian marauders who had committed depredations at Sheddo Ranch, killing 3, and capturing 12 horses and 1 mule. Corporal Frank Bratling was killed in this engagement. The department commander in General Orders thanked Captain Chilson and his men for the soldierly manner in which they had acquitted themselves. The detachment returned on the 16th, having marched 350 miles in seven days and four hours. Special mention was made by Captain Chilson of 1st Sergeant I. L. Morris, Sergeant L. S. Lytle, Corporal Frank Bratling (killed), blacksmith John Sheerin, and Private Henry Wills. Their names were forwarded to the War Department with recommendations that medals of honor be conferred upon them.

On October 1st, Captain Chilson with his troop struck a party of Indians, killing 3, and capturing large quantities of supplies.

In 1874, Troop C, with Troops K and L, formed part of an expedition under Major Price, 8th Cavalry. On the 12th of September while marching through the breaks of the Llano Estacado, Texas, the command was furiously attacked by a large body of Indians. The Indians opened the fight by charging in line from the top of a mesa upon which they had taken position, and firing heavy volleys into the command. They were met by a counter-charge from the troops and driven from hill to hill for six miles. The fight lasted three hours when, darkness coming on and the Indians scattering, the troops were withdrawn. Casualties among the Indians unknown. The U. S. troops suffered no loss.

In passing over the ground during the following month, it was found that the number of Indians (Kiowas and Cheyennes) must have been great, as 329 sets of lodge poles, five or more in a bunch, 25 saddles, many pans, kettles, and skin lodges, sacks of salt, paints, and articles valuable to Indians, were found and destroyed. Twenty-seven ponies were found dead on the ground, and at a distance from the scene of the fight a number of Indian graves were found. When the site of their camp, some 12 miles north, was reached, 294 additional bundles of lodge poles were found and destroyed, besides much other property that had been abandoned. This would indicate that there were about 460 warriors engaged in the fight. Lieutenant Farnsworth, commanding Troop H, with the wagon train, several days after the occurrence struck their trail far to the north of the Wichita, finding quantities of abandoned property and ponies. This was evidently the same party of warriors which had previously delayed a wagon train under Captain Lyman for four days. Warned of the approach of Major Price's command they had selected a good position and made the attack with confidence, but were driven off with serious losses in men, animals and property. The condition of the command at this time, being entirely out of rations and forage, subsisting upon a limited supply of buffalo meat, and having been marching continuously since the 20th of August, accounts for there having been no further pursuit.

The troop under command of Captain Hartwell, in conjunction with

Troops H, K and L, forming the command under Major Price, on November 29, 1874, had a skirmish on Muster Creek, Texas. A number of Indians were killed and wounded, and a considerable amount of Indian equipage was captured and destroyed.

On the 14th of October the troop pursued a band of Indians in the Wichita Mountains, pressing them so close as to cause them to abandon all their camp equipage which was afterwards destroyed.

From 1875 to 1879 the troop was stationed at posts and camps on the lower Rio Grande River in Texas, and from 1879 to 1885 at Forts Clarke and Duncan, and at camps on the Nueces and Pecos Rivers, Texas.

In June, 1885, it left San Antonio, Texas, and took part in the campaign against Geronimo's band of Chiricahua Apaches in New Mexico, returning to San Antonio in October, 1886.

On December 9, 1885, the troop, under Lieutenant Fountain, attacked a body of these Indians at Lillies Ranch in the Mogollon Mountains, New Mexico, as they were burning the ranch; killed 2 Indians, captured 16 horses and 1 mule, and destroyed all their provisions and blankets. Darkness permitted the Indians to escape.

On the 19th the troop, under Lieutenant Fountain, was attacked by Chiricahua Apaches ambushed on a hill near Little Dry Creek. The fight lasted fifteen minutes, when the Indians were dislodged and scattered, making their escape in a rocky cañon. Several Indians were killed and wounded. In this fight 1st Lieut. J. C. Maddox, Assistant Surgeon U. S. A., Wagoner Frank Hutton, Privates George Gibson and Harry McMillan were instantly killed; Blacksmith Daniel Collins was mortally wounded, dying two hours later, and Corporal Wallace McFarland was wounded. Three horses were killed and several wounded.

In 1887 the troop marched from San Antonio to Fort Davis, Texas, and the following year to Fort Meade, South Dakota.

TROOP D.—Captain Bassford in command of troop while scouting near Keeny's Ranch on Malheur River, Oregon, in February, 1868, surprised an Indian camp, capturing all their horses and destroying the camp.

A detachment under Sergeant New attacked a party of Indians on Owyhee River, Oregon, March 26, 1868, killing one Indian.

In an engagement near Red Creek, A. T., September 23, 1869, 18 Indians were killed and a number wounded.

Lieutenant Weeks, with a detachment of 18 men, captured 200 head of cattle near Hubbard Cross Roads on the staked plains, New Mexico, on July 9, 1870, and on the 10th of August, 1870, captured a pack train loaded with contraband goods, destroying the goods, and capturing two Indians.

Captain Randlett with 40 men, scouting south of Canadian River, on the Texas border, on the 28th of May, 1871, captured a train *en route* to the Comanche Indians. Twenty-three animals loaded with whiskey, powder, ead, etc., with 10 men and 2 Indians, were captured. On the same day 506 head of cattle and 26 burros were captured. The prisoners and stock were turned over to the commanding officer of Fort Bascom, and the stores destroyed.

Lieutenant Wilkinson with 6 men, *en route* to Tulerosa River, were

attacked by armed Mexicans, 25 in number. One Mexican was killed and 3 wounded.

On the 17th of November, 1875, Captain Randlett, Lieutenant Wilkinson and 44 men pursued a band of Mexican cattle thieves and struck them at Las Cuevas, Texas, 18 miles below Ringgold Barracks, just as they reached the Rio Grande River. Some of the cattle were captured on the Texas side and two of the thieves were killed, the remainder escaping to Mexico. Captain McNally, with a troop of State Rangers, arrived on the scene during the day and under cover of darkness crossed the river by means of a small boat and attacked the Mexicans at a ranch some 3 miles from the river, killing 4 of them. The Mexicans, however, gathered in such large numbers, that the Rangers retreated to the cover of the banks of the river, where they were protected by the U. S. troops firing over their heads. In this fire the leader of the Mexicans was killed. The Mexicans made a second attack during the day but were repulsed, when the State troops recrossed the river. On the following day the command was reinforced by troops from Fort Brown and Ringgold Barracks under Major Alexander. A flag of truce was sent over by the Mexicans and an agreement entered into by which they were to surrender the cattle and thieves, if possible, at Ringgold Barracks. With this understanding the troops were withdrawn, and the cattle were afterwards received at Ringgold Barracks and returned to the owners.

From 1875 to 1887 the troop was stationed at posts and camps near the Rio Grande River in Texas. In the latter year it took station at Fort Davis, Texas, and in 1888 marched to Fort Meade, S. D.

TROOP E.—In December, 1868, a detachment of 30 men of Troops E and K, under command of Major Price, surprised a large rancharia consisting of 20 lodges near Walker Springs, A. T., killing 3 Indians, wounding several, capturing some squaws and children, and destroying their provisions and camp equipage. Three days later another rancharia was surprised by the same command. Eight Indians were killed and 14 captured. A large quantity of supplies was destroyed.

In 1869 a detachment of Troops E and K under Captain Young, left Camp Whipple on January 19th. While scouting in Juniper Mountains, 5 rancharias, located in a deep and large cañon, were destroyed. While encamped in this cañon the camp was at 4 A. M. attacked by Indians. The horses had been fastened to a strong picket line and were soon in hand, but the burros of the pack train, being hobbled, were stampeded and secured by the Indians. Corporal Parker, Troop K was severely wounded. At daybreak the trails of the Indians, with the burros which had been taken off by twos and threes in different directions, were followed by detachments and many of them recovered. The detachment left in camp was surrounded and harassed by another party of Indians all day. This command returned to its post, Camp Whipple, on the 18th of February, having suffered greatly through the inclemency of the weather, and from the difficult country through which it was necessary to travel. It rained or snowed every day except five during the month.

Lieutenant Carrick, with detachment of 23 men of Troops E, F and K,

between the Aqua Frio and Rio Verde, near Toll Gate, A. T., encountered a band of Indians on the 25th of August, 1869, and engaged them, killing 6, wounding several, capturing 1, and destroying a large amount of property. On the 26th a rancheria was surprised and 2 Indians killed. This detachment was attacked by a party of about 100 Indians, seven miles from Toll Gate. Private Eberhard was killed. Two Indians were killed and the remainder, after a severe fight, were driven off and scattered.

On September 2, 1874, Captain Kauffman with 11 men captured 2 horses and 13 mules from Apaches at Ojo Caliente, N. M.

From 1875 to 1888, the troop was stationed on the lower Rio Grande in Texas, at Forts Clark and Duncan. It marched from the latter post in May, joined the regiment at Fort Concho, marched with it to Fort Meade, and thence to Fort Buford, N. D., a distance of over 2000 miles.

TROOP F.—A detachment of 13 men while scouting, March 19, 1867, on the Selvie River, Oregon, had an engagement with Indians, killing 6, and wounding the chief, and capturing 32 horses and a large amount of dried beef, etc.

Lieutenant Jerome, with 21 men (in conjunction with Troops E and K), under Major Price, destroyed 15 wicky-ups, killing 3 warriors and captured a horse and rifle. The same detachment was attacked by a large body of Indians near Toll Gate. Private Kline was wounded. Two Indians were killed. Lieutenants Carrick and Jerome with 42 men under Major Price came upon and surprised a band of Indians on the Santa Maria River on June 26, 1869, killing 4, and destroying 200 wicky-ups and large quantities of supplies.

During the month of May, 1871, Lieutenant Caraher with 52 men pursued, and captured near Kiowa Springs, N. M., 21 Indians, 1 Mexican, 700 head of cattle, 12 horses and 49 burros.

Lieutenant Hennisee, in June, 1871, captured a large herd of cattle in the same vicinity.

Detachments of the troop participated in several skirmishes with Indian marauders along the Rio Grande River, Texas, in 1876, destroying several Indian camps and a large amount of property.

In 1877, Lieutenant Phelps with 10 men (in conjunction with Lieutenant Bullis, in command of Seminole Scouts) on the 26th of September, crossed the Rio Grande River, and attacked a band of Lipan and Apache Indians, capturing 5, together with 12 horses and 2 mules.

In 1888, the troop marched with the regiment to Dakota.

TROOP G.—In 1867, a detachment under Sergeant Stickney, from August to December, had several skirmishes with Indians and captured and destroyed a large amount of property.

On May 1, 1868, a detachment had an engagement near Hoag's Bluffs, Oregon, in which Private Arnshedt was severely wounded. A number of the Indians were killed and wounded.

Lieutenant Lafferty with a detachment of 25 men (in conjunction with Troop G, 1st Cavalry, Captain Bernard) encountered a large band of hostiles at Chiricahua Pass, A. T., October 20, 1869. Lieutenant Lafferty was very seriously wounded and Sergeant Stevens and Private Fuller were killed.

Private Elwood was severely wounded. The number of Indians killed and wounded was supposed to be large.

On the 27th of January, 1870, a detachment (in conjunction with a detachment of Troop G, 1st Cavalry) engaged with Apaches in the Dragoon Mountains, A. T., killing 13 and capturing 1 Indian and 12 horses. The Indian supplies were all destroyed.

In the Oscura Mountains, N. M., in 1875, the troop, Captain Fechet commanding, surprised a large camp of Apaches, routing them, and capturing 300 buffalo robes, 51 horses, 70 saddles, 3 mules, and a large quantity of powder and lead and camp equipage.

From 1875 to 1888, the troop was stationed at camps and posts in Texas, marching from Camp Pena Colorado, Texas, to Fort Yates, Dakota, in the latter year.

TROOP H.—Lieutenant Farnsworth with 28 men while scouting as a detachment from the command of Major Price in 1874, engaged about 100 well-mounted Cheyennes on McClellan's Creek, Texas. The fight lasted from 1.30 P. M. till dark. The Indian loss was 4 killed and 10 wounded, as well as many ponies killed. The detachment lost Privates William Denham and Rufus Hibbard, killed. Corporal Thomas J. Thompson, Blacksmith Henry Fields, Privates Hermann Fehrand George Robinson wounded. His ammunition being exhausted, Lieutenant Farnsworth retreated under cover of darkness. Major Price, who visited the scene of the fight soon afterwards, says in his report, "There were evidences of an encampment of at least 150 Indians on both sides of the stream. I followed the entire course of Captain Farnsworth's fight for eight miles, and considered it a stubbornly contested and desperate fight. I make no estimate of the number of Indians killed. The troops and Indians were at all times in close bullet range of each other and I know that there are cool, daring men in the troop, and good shots. The body of Private Hibbard was found and buried."

(The troop was engaged in a skirmish on Muster Creek as noted in the history of troop C.)

From 1875 to 1879 the troop was in camps or at posts along the lower Rio Grande. In 1884, it took station at San Antonio, Texas. In 1885 and 1886 it served in New Mexico in campaign against the Apaches. In 1887 it marched to Fort Davis, thence in 1888 to Fort Keogh, Montana.

TROOP I.—On the 16th day of April, 1867, the troop under Captain Fechet and in conjunction with Troop B, had an engagement with hostile Apaches in the Black Mountains, A. T. No casualties were reported.

On the 18th of the same month, in an engagement near the Rio Verde, 1 man was killed. The Indians lost a number killed and wounded.

The troop under Captain Fechet, near Camp Grant, A. T., had an engagement with Indians on the 21st of April, 1868, killing 2; and on the 1st of May the same command attacked a band of Indians, killing 6 and wounding 4.

The troop under command of Major Alexander, while scouting in the Tonto Creek Valley, came upon, and engaged a band of Apaches, killing 1 and capturing 1 Indian and all their stock.

On September 6, 1868, the same command pursued a party of Indians

who had stolen Government property, overtook them, killed 1, recovered the stolen property, and destroyed a large quantity of bows, arrows, etc.

In 1869 the troop and detachments travelled in execution of escort, scouting duties, etc., an aggregate of 8000 miles, which indicates the arduous service performed in that desolate country.

In 1873 a detachment of 20 men under Lieut. William Stephenson pursued a party of Indian thieves, overtook them, killing one and recovering the stolen stock.

From 1875 to 1888 the troop was stationed at camps and posts on the lower Rio Grande in Texas, marching to Fort Meade, Dakota, in the latter year.

TROOP K.—Captain S. B. M. Young, with two commissioned officers (Lieuts. J. D. Stevenson and A. A. Reese, 8th Cavalry) and 42 enlisted men, left Camp Mojave, January 9, 1868. On the 13th, one-half the command, under Lieutenant Stevenson with Lieutenant Reese, was instructed to scout on the west slope of the Cerbert Range for 15 or 20 miles, thence across the range to Fortification Springs, down the eastern slope to Three Buttes and towards Peacock Springs. With the remainder of his command, Captain Young attempted to cross the range at Difficult Pass, but could not get the animals up on account of the ice and snow. They marched north to O'Leary's Pass, camping in a wash on the eastern slope, having marched 25 miles. The command had been obliged to walk the most of the day through several inches of snow which melted during the day and froze at night. At 3 P. M. a snow storm set in, lasting till 11.30 P. M. About midnight a guide came into camp and reported a camp of Indians within six miles. At 3 o'clock A. M. on the 14th, camp was broken, a cold breakfast eaten and, leaving 3 men to guard the pack train, the command set out exploring every cañon with dismounted men. At daylight Indian signs were discovered and at 8 o'clock it became evident that the Indians were in the vicinity and apparently unaware of the presence of the troops. Their camp was finally located in Difficult Cañon, and, leaving 4 men to hold the horses at the mouth of the cañon, Captain Young proceeded with 14 men to attack a rancheria of 11 wicky-ups, which developed a force of upwards of 100 Indians. The Indians took to the rocks about 10 yards from their houses. Here they fought desperately, being armed with about 40 breech-loading and 20 muzzle-loading arms. After a hard fight of one hour and, a half, 2 men having been seriously wounded, and more Indians appearing on both flanks, the command was successfully withdrawn to the horses, bringing every man out. Sixteen dead Indians were counted and several wounded. At one mile distant from the scene of this action the wounds of the two men were dressed. Coffee was made and the command proceeded to Beal's Springs, arriving at 10 P. M.

At 2 o'clock A. M., a courier from Lieutenant Stevenson, brought in word that his detachment had had an engagement, and that he had been seriously wounded. Lieutenant Stevenson's detachment discovered a large body of Indians (60 or 70) on the 15th, well armed, and posted on a high ledge of rocks. Lieutenant Stevenson was wounded in three places at their first fire. He directed his men to seek shelter in the rocks and a desperate

fight was kept up till dark, when the command slowly withdrew. Several Indians were killed and wounded. By the 16th, the wounded had been sent in to the post and Lieutenant Reese had joined with 19 men. The interim had been spent in scouting the vicinity dismounted, giving the animals a much needed rest after the rough marching over the foot-hills in mud, rain and snow,

On the 17th the united command marched by way of Hualapais Valley, and on the 18th reached Difficult Cañon, finding that the Indians had buried their dead and horses. The command returned to Camp Mojave on the 20th January, having averaged 25 miles per day for 10 days, marching through snow, rain and mud, over a mountainous country, besides spending much time in scouting dismounted. Those familiar with the nature of the ground in the mountainous regions of Arizona will thoroughly appreciate the difficulties of the scouting and Indian fighting encountered on these expeditions, which in the last instance recorded, is but a fair sample of many of the others more briefly referred to. It is either snow, rain and mud in winter; or burning heat and no water in summer.

On the 11th of December, 1868, a detachment of 10 men under Major Price had two engagements with Indians near Willow Grove, killing 8, wounding several, and destroying their camps and supplies. Sergeant Curtin C. Miller was killed.

In the same month a detachment of 30 men of Troops E and K under Major Price, surprised a rancheria of 20 lodges; killed 11 Indians, captured several and destroyed their supplies.

On June 7, 1869, Captain Young, with 19 men, engaged a party of hostile Indians at Mammoth Cañon in the Santa Maria Range, killing 3 Indians and destroying a large amount of supplies.

In August, 1869, Lieutenant Carrick, commanding a scouting party of Troops E, F and K, had several encounters with Indians, killing 8, capturing several, and destroying their camps and supplies.

In November, 1869, detachments under Lieutenants Stevenson and Pullman captured and destroyed a quantity of Indian property. The troop formed a part of the command under Major Price in 1874, and participated in the engagements heretofore recorded.

The troop in 1885 and 1886, under Captain Sprole, took part in the Geronimo campaign in New Mexico.

In 1888 it marched with the regiment to Fort Meade, S. D., thence to Fort Buford, N. D.

TROOP L.—October 6, 1867, the troop under command of Lieutenant Wells had an engagement with Indians in the vicinity of Trout Creek, A. T., killing 7 and destroying their property. On the 25th a detachment under Lieutenant Wells had a skirmish near Truxell Springs, killing 1 Indian.

A detachment of 9 men under Lieutenant Hasson, 14th Infantry, with a detachment 1st Cavalry, had a severe engagement on the 3d of November, 1867, near Willow Grove, killing 32 Indians and destroying their property.

Thirty men under Lieutenant Wells, scouting near Toll Gate, A. T.,

surprised a band of Indians on the 7th of November, killing 3 Indians and capturing 2 horses.

A detachment under Lieutenant Wells, on the 13th of August, 1868, engaged a party of Indians near Walnut Grove, killing several and destroying their camp supplies.

On November 9th a detachment of Troops B and L, under Lieutenant Wells, attacked a band of Indians, killing 15 and wounding 7; and on the 11th surprised a band, killing 6 and capturing 4. Privates E. R. Aston and William Cubberly were slightly wounded.

A detachment of 4 men, under Sergeant Rowalt, in pursuit of a band of 17 Kiowas, overtook them February 26, 1873, and engaged them, killing 5 and wounding 3. The gallant action of this little party was commended by the department commander in G. O. No. 5, Dep't Mo., Series of 1873.

In 1874 the troop under Captain Morris formed a part of the command of Major Price, participating in fights on the Rio Negro, Muster Creek, etc.

In 1888 it marched from Fort Hancock, Texas, to Fort Keogh, Montana.

TROOP M.—Until 1870 the troop was stationed in Nevada, the greater part of the time at Fort McDermitt, furnishing escorts and guards and making frequent scouts.

From 1870 to 1875, while stationed in New Mexico, much of the time was spent in field duty. In 1875 the troop marched from Fort Union, New Mexico, to Ringgold Barracks, Texas. Until 1881 it occupied camps and posts in Texas, from Fort Brown to Fort Clarke. From 1881 to 1885 it was at Fort Leavenworth, Kansas. In 1886 and 1887 it was at Fort Brown, and in 1888 marched to Fort Meade, S. D.

The foregoing brief notices of a few of the scouts and expeditions participated in by the different troops of the regiment are confined to those only where certain results were accomplished in the way of dispersing bands of Indians by actual contact with them. Numerous hard marches through the mountains and deserts of Arizona, exposed to the extremes of heat and cold, thirst and hunger, were made by troops and detachments when, though the results were not so apparent, the work was equally difficult. Some of the officers and men who experienced the trials and hardships of those comparatively early days in Arizona are still in the regiment.

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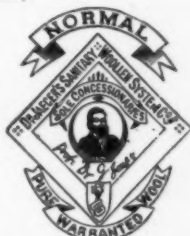
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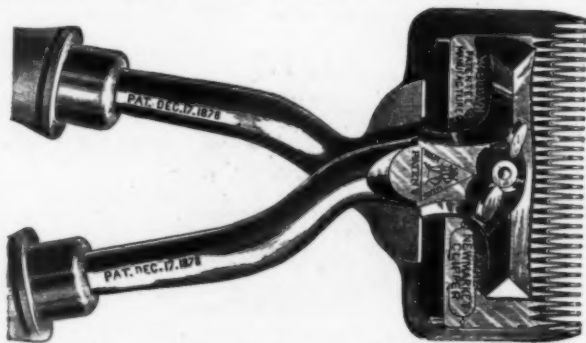
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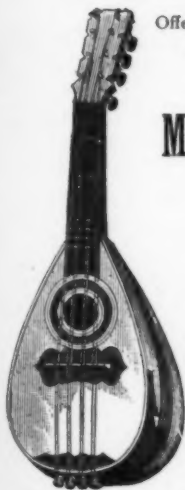
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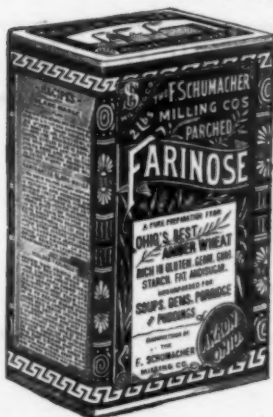
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ALRANIA,	HALF SHELL,	PURF,
BLOOM OF YOUTH,	HAVANA PUFF,	RAMON ALPHONSO,
BOB'S CIGARROS,	HENRY LEE,	R. C. B. & Co.'s BOUQUET,
" O. F.	KEY WEST,	R. C. B. & Co.'s Clear Havana,
" INVIGORATORS,	KID GIOVE,	R. C. B. & Co.'s Grand Londres,
BOSTON CUT-OFFS,	LA AGILIDAD,	RED RIBBON,
BOUQUET,	LA CELADA,	RESOLUTION,
BROWN'S BOYS,	LA CONFIDENCIA,	ROBERT BURNS,
BROWN'S GIRLS,	LA CORONA,	ROSE FRAGRANCE,
CABANAS,	LA FLOR DE BROWNERO,	ROSA SAN JAGO,
CALIDAD,	LA FLOR ISABELLA,	ROYAL OWL,
CALL AGAIN,	LAGER,	SAPPHO,
CAPADURA,	LA MULO,	S. S. S. S.
CHEROOTS,	LA PALOMA,	SEDATIVE,
CHAUNCEY M. DEPEW,	LA ROSE FRAGRANTE,	SILK WEAVERS,
CHURRUCA,	LA ROSE BRITANNICA,	STOORM'S STRAIGHT TEN,
CLEOPATRA,	LA ROSITA,	STOORM'S INFANTES,
COCKTAIL,	LATEST WRINKLE,	ST. GEORGE,
COKALIE,	L'ENVOIE,	STUNFLOWER,
CZAR,	LITTLE LORDS,	S. & S. BEST HALF DIME,
DIGNITY,	MANUEL GARCIA,	TABLE D'HOTE,
EAGLE,	MERCURIO,	TEA ROSE,
EL ABSEQUOS,	MIRANDA,	THE GREAT TURF,
EL BOCO,	MUM,	THE DAISY,
ELMA,	NATALIE,	TICKER,
EL REY CUBANO,	NUMBER THREE,	TOM MOORE,
EL SOBRANO,	NUN NICER,	TOO TOO,
EQUIVALENT,	NEW YORK CUT-OFF'S	U NO ME,
ETIQUETTE,	OLD GUARD,	VINDICATOR,
FACTORY, No. 11.	OLD MASTER,	VIVA,
FAULTLESS,	OLD TIMES,	WHIFFS,
FIGARO,	OUR COUSINS,	WHOA EMMA,
FIRST NATIONAL,	OUR DADDIES,	WIDOW,
FLOR DE YUCLAN,	OUR KEY WEST,	YACHT CLUB,
FLOR D'ENID,	OWL,	YUM YUM,
FLORIDINA,	PACIFIC,	ZERLINA,
FORGET-ME-NOT,	PERT,	ZILLAH.

Any of the above can be secured through the Commissary Department or direct from us.

The F. SCHUMACHER MILLING CO., AKRON, OHIO.



MANUFACTURERS OF

ROLLED AVENA (OATS),

PUT UP IN BARRELS AND CASES, 36 PACKAGES, 2 LBS. EACH.

ALWAYS PURE!

ALWAYS RELIABLE!

OATMEAL, ROLLED AND CRACKED WHEAT, WHOLE
WINTER WHEAT AND W. W. GRAHAM FLOUR,
HOMINY, WHITE AND YELLOW
GRANULATED CORNMEAL.

Have recently added to their long list, a new Cereal of inestimable value to those suffering from impaired digestion.

Rich in gluten, germ, gum and dextrine, it is favorably received everywhere under the name and trade-mark

Schumacher's Parched Farinose!

For infants it may well supersede all other foods (save milk, which can never find a perfect substitute during the first weeks of life), because its ready and perfect digestion involves no strain upon feeble digestive powers. It contains all the elements demanded by the growing life, and for like reasons is equally adapted for invalids. By fever patients it is used as a thin gruel and is partaken with some relish, even when genuine appetite and all craving for food are suspended. Its bland, mucilage-like qualities peculiarly adapt it to all inflammatory conditions, especially in typhoid and other states in which intestinal lesions exist which are liable to be increased by irritating food. For the **Brain Worker** it will be found satisfying and helpful, because of its high phosphatic qualities. For all refined, active, ardent, progressive human beings, it will prove a **PERFECT FOOD**, supplying all waste and restoring every exhausted energy. Added to all its excellences, its appetizing flavor will commend it to the palates of man, woman and child alike.

AGENTS.

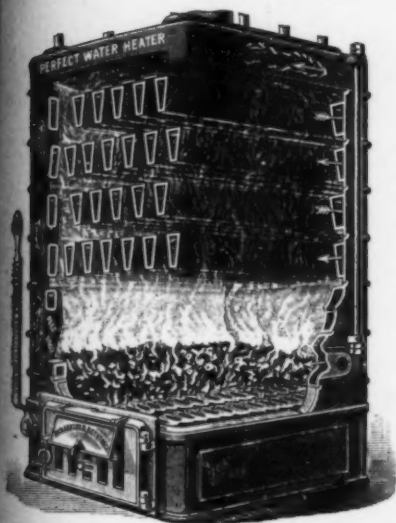
CHAS. MUNS, 41 Water St., N. Y.
POTTER & WRIGHTINGTON, Boston.

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— SEE —
WHAT 2½ CENTS PER ROOM PER DAY
WILL DO.



LANSING, KANSAS.

RICHARDSON & BOYNTON CO.

GENTS: Referring to the No. 5 Perfect Hot Water Heater put in my residence last fall would say, I find it Economical, Powerful, Effective and Satisfactory. It is connected with 12 radiators. I use soft coal. Heating 12 rooms twenty-four hours per day in very cold weather at the trifling cost of 2½ cents per room per day.

Would be pleased to show any person who wants to keep an even temperature, at a small cost of fuel, and labor, this system.

Yours,

T. P. GAMBLE.

THE "PERFECT" HEATER

is the most powerful Water Heater ever constructed.

SEND FOR CIRCULARS, ETC.

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RICHARDSON & BOYNTON CO.'S

Furnaces, Fireplace Heaters and Ranges

USED SO LARGELY IN THE VARIOUS ARMY POSTS IN THE U. S.



Almost goes alone.

What there is to know about Lamps.

All the care it wants is filling and wiping; five minutes a day is enough for that; no knowledge or skill required—the Pittsburgh.

There are a dozen other central-draft lamps, all troublesome, foul by habit, with dirt-pockets, hard to clean, offensive in smell, exacting, perplexing—one must serve an apprenticeship at them—but they were excellent lamps last year.

The Pittsburgh pours forth a flood of 'mellow light, as much as eighty candles together, and costs two-thirds of a cent an hour for oil, the lamp itself from \$2.50 to \$50, according to style—the cheapest as good as the costliest—not so pretty—best in the world. It is indeed a wonderful lamp, and costs no more than the troublesome ones.

You can see it at any good store where lamps are sold—a store six months behind is not a good store.

Two sizes: one for family use, to hold three pints of oil and burn twelve hours; the other for public use, to hold a gallon, burn eleven hours, and give the light of three-hundred candles.

Three kinds of family lamps as to holders: vases, twenty-inch stands for the dining table, five-foot stands for the floor.

We will send you a primer; but buy of your neighbor merchant.



Pittsburgh Brass Company,
PITTSBURGH, PA.

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PHILADELPHIA.

IMPORTING AND MANUFACTURING

* * * **DRUGGISTS AND CHEMISTS.**

IMPORT—

OLIVE OIL, Finest Quality for Table Use.

WHITE CASTILE SOAP,

BENBOW'S ELDER FLOWER & WINDSOR SOAPS,

also a full line of other choice English and French Soaps and Perfumery.

MANUFACTURERS OF

ABSOLUTELY PURE SPICES AND FLAVORING EXTRACTS,

in all their variety.

POWDERED VANILLA BEAN, (for Culinary Purposes).

This line of goods claim our best attention, and will be kept up to the highest grade of excellence.

Johnston's Fluid Beef.

This is a thoroughly well prepared **Extract of Beef**, combined with 20 per cent. of fresh beef, desiccated, and then reduced to an impalpable powder. It is claimed, and the claim is admitted by all who have made comparative tests, that this preparation of beef possesses greater *nutritive* qualities than any other extract of meat yet offered.

We append the analysis made by

W.M. HARKNESS, F. C. S. L., Analytical Chemist to the British Government.

LABORATORY, Somerset House, London, Eng.

I have made a very careful chemical analysis and microscopical examination of JOHNSTON'S F.L.S. BEEF, and find it to contain in every 100 parts:

Molsture,	26.14	
Albumen and Gelatine,	21.81	Nitrogenous or
Fibrine in a readily soluble form,	37.48	flesh-forming food.
Ash or Mineral Matter,	14.57-100.00.	

"The mineral matter is rich in phosphates. The microscopical examination shows the FLUID BEEF to contain good, sound beef, ground to a very fine powder. There is not the slightest trace of fungus, spores, or any other organism which would tend to produce decomposition. I consider this a most valuable preparation, combining, as it does, a concentrated Extract of Beef with the solid beef itself,—the latter being in a form easily digested."

Differing in all essential points from other Meat Extracts in the Market.

A PERFECT FOOD

For the healthy or the invalid. Unequalled for Beef Tea, Bouillon, Soups or Sauces

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ROBERT SHOEMAKER & CO.,

PHILADELPHIA.

Royal Baking Powder Leads All.

The United States Official Investigation

Of Baking Powders, recently made, under authority of Congress, by the Department of Agriculture, Washington, D. C., furnishes the highest authoritative information as to which powder is the best. The Official Report

shows the ROYAL superior to all others in leavening power; a cream of tartar powder of highest quality.

The Royal Baking Powder is thus distinguished by the highest expert official authority the leading Baking Powder of the world.

P. S.—Falsification of Government Reports Exposed.

Secretary of Agriculture Gen. Rusk in an official letter in defense of his department, and as a duty to the public, exposes the statements of another baking powder company to the effect that its powder was shown by this investigation of equal strength with Royal, as misquotations and misrepresentations of the Government report.

The public should be on guard against such false statements made for advertising purposes. The official investigations show that the Royal Baking Powder has no equal in purity, strength, wholesomeness or keeping qualities.